VOL. 30, NO. 6 JUNE, 1953

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Published Monthly by the AMERICAN JOURNAL OF OPTOMETRY PUBLISHING ASSOCIATION
1502 Foshay Tower 821 Marquette Ave., Minneapolis 2, Minn.

ANNUAL SUBSCRIPTION, UNITED STATES and CANADA $6.00. FOREIGN $6.50
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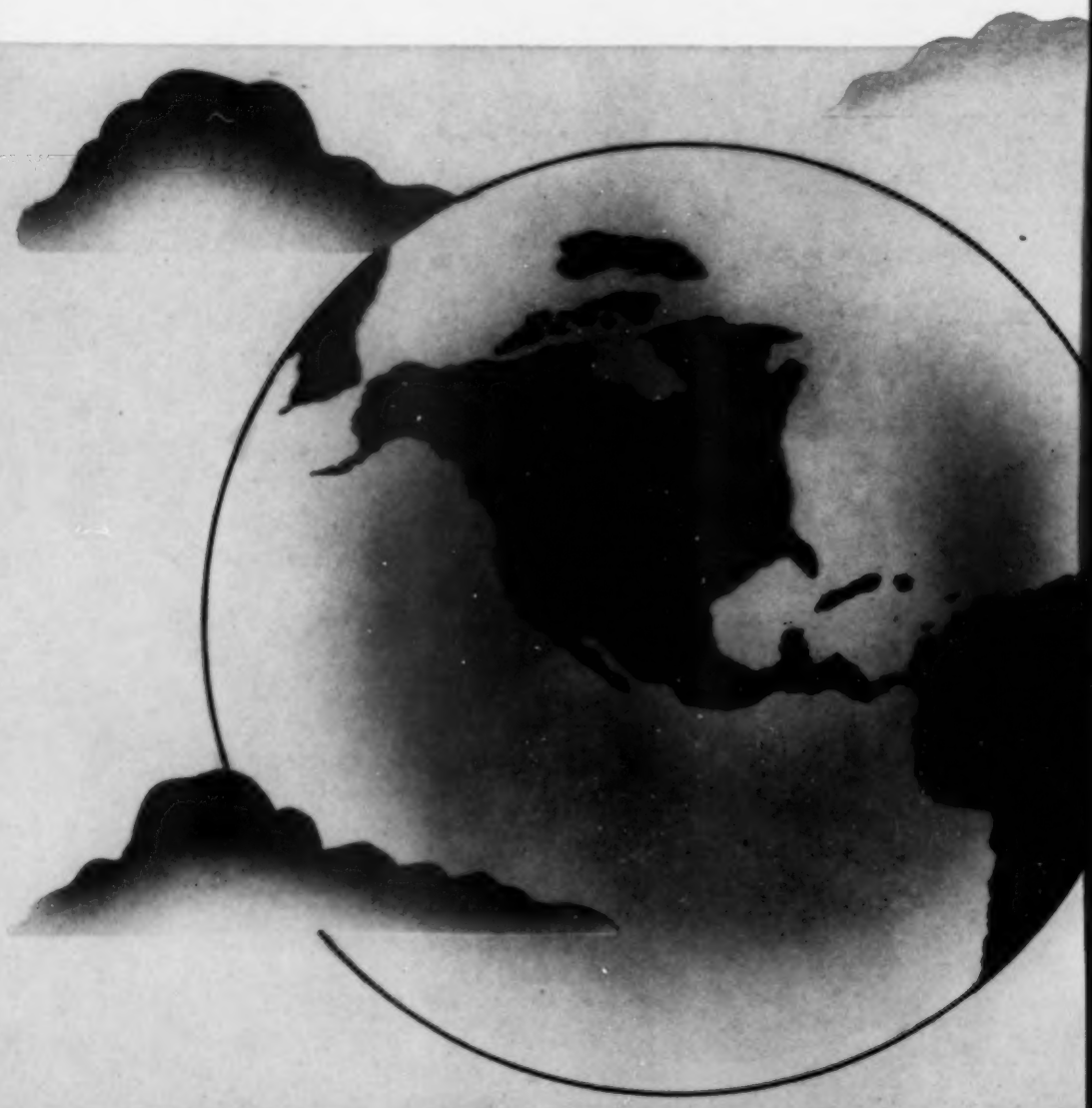

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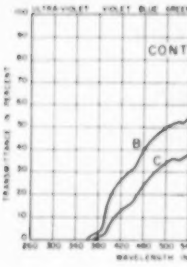


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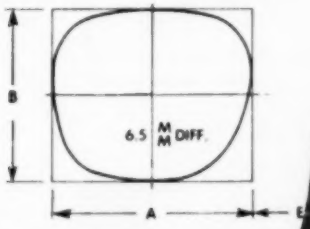


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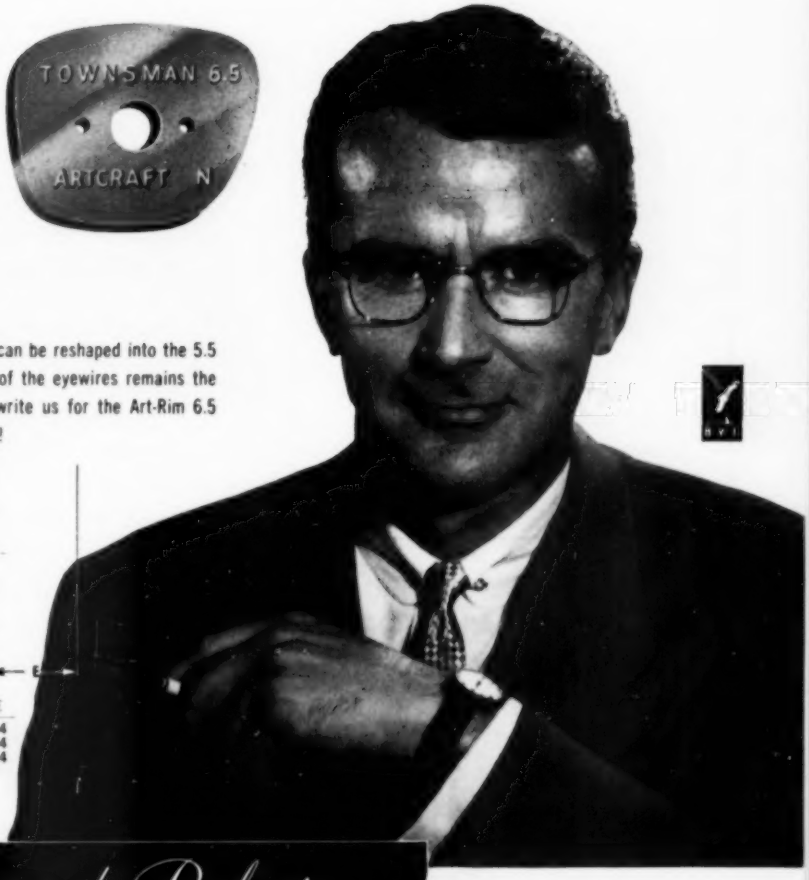

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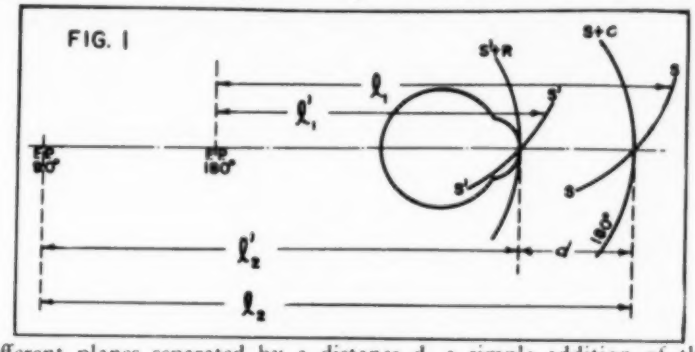
# OPTICAL, PHYSIOLOGICAL AND PERCEPTUAL FACTORS INFLUENCING THE OPHTHALMOMETRIC FINDINGS*

Julius Neumueller†
Pennsylvania State College of Optometry
Philadelphia, Pennsylvania

As suggested by the title this paper is divided into three parts. The first two parts were written and published in 1930 and 1933 respectively and are repeated by virtue of an invitation by the Committee on Papers of the American Academy of Optometry. For completeness it was considered desirable to add the third part concerning the perceptual factor.

The first part expresses the cylindrical component of the correction in terms of the ophthalmometric reading R and the spherical components of the correcting lens. Figure 1. As S and R occur in two




different planes separated by a distance d, a simple addition of these two quantities is not permissible. The first step is to find the effectivity

*Read before the annual meeting of the American Academy of Optometry, Rochester, New York, December 8, 1952. For publication in the June, 1953, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.
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†Optometrist, Chief of Clinics, Fellow, American Academy of Optometry.

of S upon the corneal plane, thus finding the spherical component S′ of the correction if applied in the plane of the cornea. To this S′ can now be added the ophthalmometric reading R. This sum represents the power in the secondary principal meridian of the correcting lens applied at the corneal plane. Retracing the first step by finding the effectivity of this power S′ + R when placed in the plane of the correcting lens completes the task.

Referring to Figure 1 we derive

$$l_1 = \frac{1}{S}$$

and,

$$l_1' = l_1 - d$$

then,

$$S' = \frac{1}{l_1'} = \frac{S}{1 - dS}$$

Power in secondary principal meridian = S′ + R

then,

$$l_2' = \frac{1}{S' + R} = \frac{1 - dS}{S + R\ (1 - dS)}$$

and,

$$l_2 = l_2' + d$$

Thus the power on the secondary principal meridian in the plane of the correcting lens:

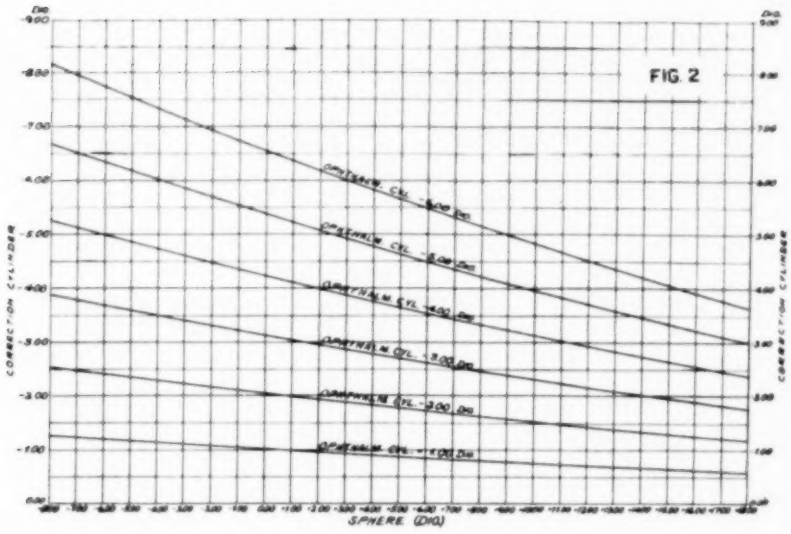
$$S + C = \frac{1}{l_2} = \frac{1}{l_2' + d} = \frac{S + R - dSR}{1 + dR - d^2SR}$$

and finally

$$C = (S + C) - S = \frac{R\ (1 - dS)^2}{1 + dR\ (1 - dS)}$$

This formula was used for the computation of the values shown in Table I, taking d as 13.75 mm., the accepted distance from vertex of correcting lens to cornea. Figure 2 presents these values in the form of a graph. The power of the cylindrical component of the correcting lens is given by the ordinate of the graph bounded by the abscissa axis and the slightly oblique lines representing the different ophthalmometric readings. The table and graph have been extended into the region of the plus spherical component in order to include the corrections for aphakia.

These results show that plus spherical components tend to reduce the cylindrical values found by the ophthalmometer while the opposite




applies to minus spherical corrections. Within the range of +2.00 D. and —2.00 D. and up to about —2.00 D. corneal astigmatism, the induced changes are not significant.

These values must be supplemented by the allowance for the noncorneal astigmatism. The allowance for this physiological astigmatism ranges from —.25 D. axis 90 (or +.25 D. axis 180) to —.75 D. axis 90 (or +.75 D axis 180). Many years of refractive experience

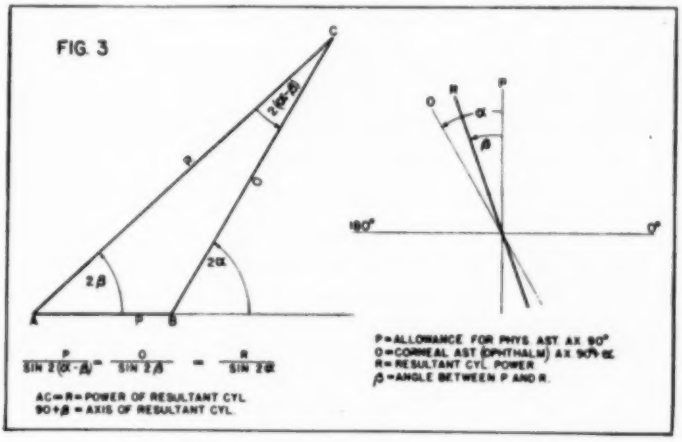


FIG. 3
P = ALLOWANCE FOR PHYS. AST. AX. 90°
O = CORNEAL AST. (OPHTHALM.) AX. 90°
R = RESULTANT CYL. POWER
β = ANGLE BETWEEN P AND R.
AC = R = POWER OF RESULTANT CYL.
90 + β = AXIS OF RESULTANT CYL.

| SPHERICAL CORRECTION | OPHTHALMOMETER READING | | | | | |
|---|---|---|---|---|---|---|
| | -1.00ax | -2.00ax | -3.00ax | -4.00ax | -5.00ax | -6.00ax |
| -8.00 | -1.25 | -2.54 | -3.87 | -5.25 | -6.67 | -8.14 |
| -7.00 | -1.22 | -2.48 | -3.78 | -5.12 | -6.50 | -7.93 |
| -6.00 | -1.19 | -2.42 | -3.68 | -4.98 | -6.33 | -7.72 |
| -5.00 | -1.16 | -2.35 | -3.58 | -4.85 | -6.16 | -7.52 |
| -4.00 | -1.13 | -2.29 | -3.49 | -4.73 | -6.00 | -7.31 |
| -3.00 | -1.10 | -2.23 | -3.40 | -4.60 | -5.84 | -7.12 |
| -2.00 | -1.07 | -2.17 | -3.31 | -4.48 | -5.68 | -6.92 |
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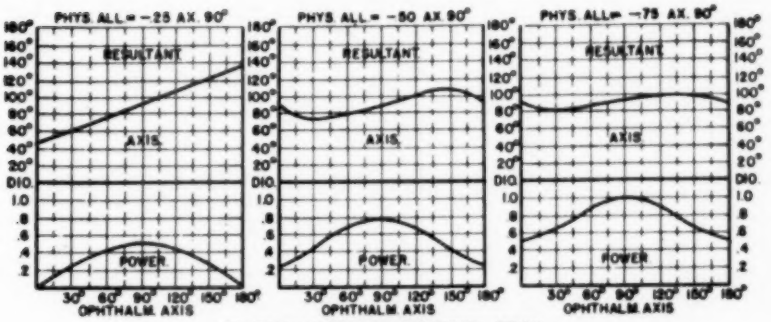
| +3.00 | -0.93 | -1.89 | -2.87 | -3.88 | -4.92 | -5.99 |
| +4.00 | -0.90 | -1.83 | -2.79 | -3.77 | -4.78 | -5.81 |
| +5.00 | -0.88 | -1.78 | -2.71 | -3.66 | -4.63 | -5.64 |
| +6.00 | -0.85 | -1.73 | -2.62 | -3.55 | -4.49 | -5.46 |
| +7.00 | -0.83 | -1.68 | -2.55 | -3.44 | -4.35 | -5.30 |
| +8.00 | -0.80 | -1.62 | -2.47 | -3.33 | -4.22 | -5.13 |
| +9.00 | -0.78 | -1.57 | -2.39 | -3.23 | -4.09 | -4.97 |
| +10.00 | -0.75 | -1.52 | -2.31 | -3.12 | -3.95 | -4.81 |
| +11.00 | -0.73 | -1.48 | -2.24 | -3.02 | -3.83 | -4.65 |
| +12.00 | -0.70 | -1.43 | -2.17 | -2.92 | -3.70 | -4.49 |
| +13.00 | -0.68 | -1.38 | -2.09 | -2.83 | -3.57 | -4.34 |
| +14.00 | -0.66 | -1.33 | -2.02 | -2.73 | -3.45 | -4.19 |
| +15.00 | -0.64 | -1.29 | -1.95 | -2.64 | -3.33 | -4.05 |
| +16.00 | -0.61 | -1.24 | -1.89 | -2.54 | -3.21 | -3.90 |
| +17.00 | -0.59 | -1.20 | -1.82 | -2.45 | -3.10 | -3.76 |
| +18.00 | -0.57 | -1.16 | -1.75 | -2.36 | -2.99 | -3.62 |

Corrected cylindrical components as derived from the influence of the ametropic spherical component upon the ophthalmometer reading.

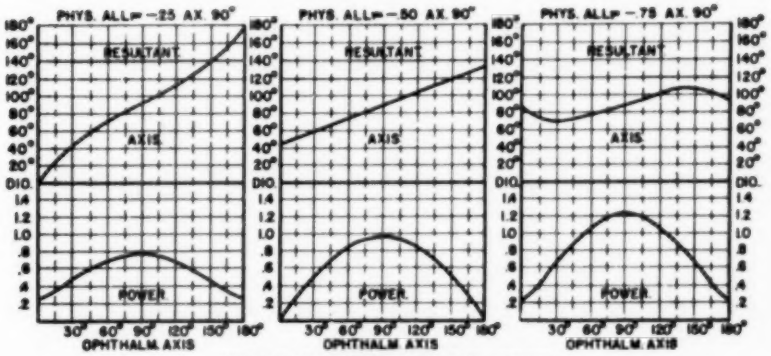
TABLE I

indicate to the writer that physiological astigmatism increases with age.

The second modification of the ophthalmometric reading occurs in cases of oblique corneal astigmatism. In such cases the corneal reading and the allowance for the physiological astigmatism combine as two obliquely crossed cylinders to the final correcting cylinder. As a result of such a combination the cylinder undergoes a change in axis as well as in power with a residual spherical component. The latter will affect




OPHTHALMOMETER READING -.25 AX.




OPHTHALMOMETER READING -.50 AX.

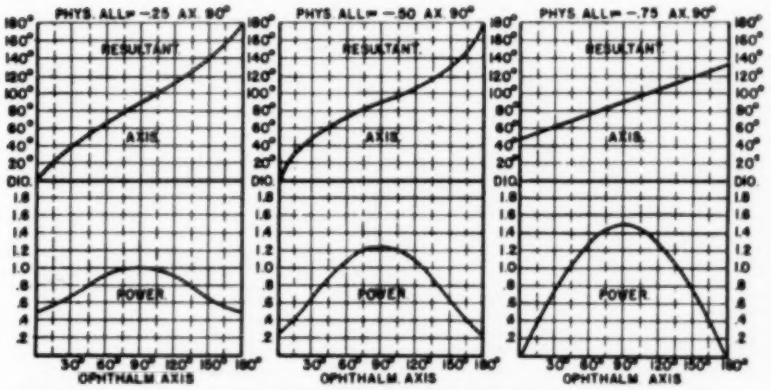
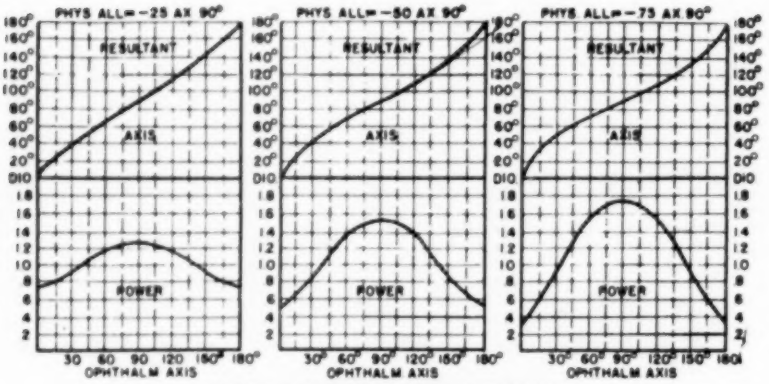
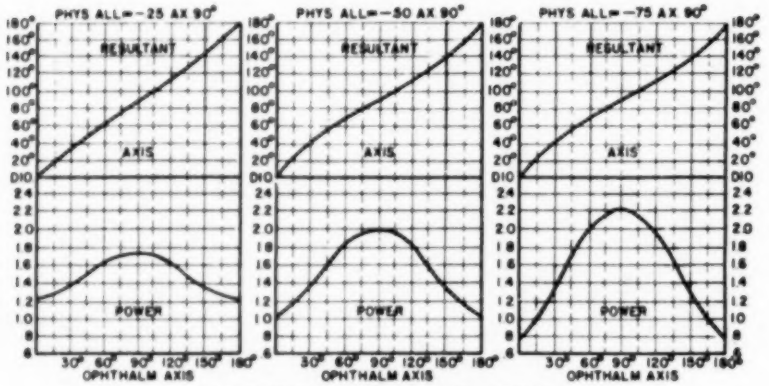



FIG. 4

OPHTHALMOMETER READING -.75 AX.




OPHTHALMOMETER READING -1.00 AX




OPHTHALMOMETER READING -1.50 AX

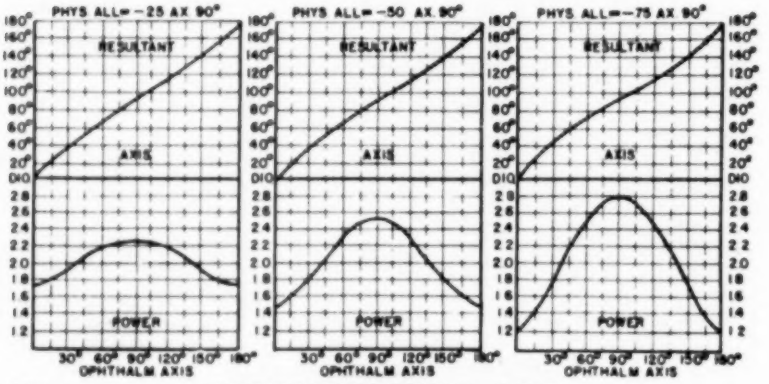



FIG. 5 OPHTHALMOMETER READING -2.00 AX

the spherical component of the ametropia and will not appear as a separate quantity.

Figure 3 shows the conventional graphical method of combining two obliquely crossed cylinders. O designates the ophthalmometric

TABLE II

| RESULTANT CYLINDER of OPHTH. CYLINDER ⊂ PHYS. ALLOWANCE | | | | | | | |
|---|---|---|---|---|---|---|---|
| OPHTHALMOMETER READING −.25 AXIS | | | | OPHTHALMOMETER READING −.50 AXIS | | | |
| OPH. AX. | PA−.25 AX 90° | PA−.50 AX 90° | PA−.75 AX 90° | OPH. AX. | PA−.25 AX 90° | PA−.50 AX 90° | PA−.75 AX 90° |
| 0° | 0 | .25 AX 90° | .50 AX 90° | 0° | .25 AX 0° | 0 | .25 AX 90° |
| 15° | .13 AX 52° | .30 AX 77° | .55 AX 83° | 15° | .31 AX 27° | .26 AX 53° | .41 AX 71° |
| 30° | .25 AX 60° | .43 AX 73° | .67 AX 81° | 30° | .44 AX 45° | .50 AX 60° | .65 AX 70° |
| 45° | .36 AX 68° | .56 AX 76° | .79 AX 81° | 45° | .58 AX 58° | .71 AX 68° | .90 AX 73° |
| 60° | .44 AX 75° | .67 AX 80° | .90 AX 83° | 60° | .67 AX 70° | .87 AX 75° | 1.05 AX 79° |
| 75° | .48 AX 83° | .73 AX 85° | .97 AX 86° | 75° | .72 AX 80° | .96 AX 85° | 1.21 AX 84° |
| 90° | .50 AX 90° | .75 AX 90° | 1.00 AX 90° | 90° | .75 AX 90° | 1.00 AX 90° | 1.25 AX 90° |
| 105° | .48 AX 97° | .73 AX 95° | .97 AX 94° | 105° | .72 AX 100° | .96 AX 97° | 1.21 AX 96° |
| 120° | .44 AX 105° | .67 AX 100° | .90 AX 97° | 120° | .67 AX 110° | .87 AX 105° | 1.05 AX 101° |
| 135° | .36 AX 112° | .56 AX 104° | .79 AX 99° | 135° | .58 AX 122° | .71 AX 112° | .90 AX 107° |
| 150° | .25 AX 120° | .46 AX 107° | .67 AX 99° | 150° | .44 AX 135° | .50 AX 120° | .65 AX 110° |
| 165° | .13 AX 128° | .30 AX 103° | .55 AX 97° | 165° | .31 AX 153° | .26 AX 127° | .41 AX 109° |
| 180° | 0 | .25 AX 90° | .50 AX 90° | 180° | .25 AX 180° | 0 | .25 AX 90° |
| OPHTHALMOMETER READING −.75 AXIS | | | | OPHTHALMOMETER READING −1.00 AXIS | | | |
| OPH. AX. | PA−.25 AX 90° | PA−.50 AX 90° | PA−.75 AX 90° | OPH. AX. | PA−.25 AX 90° | PA−.50 AX 90° | PA−.75 AX 90° |
| 0° | .50 AX 0° | .25 AX 0° | 0 | 0° | .75 AX 0° | .50 AX 0° | .25 AX 0° |
| 15° | .55 AX 22° | .40 AX 34° | .39 AX 53° | 15° | .79 AX 20° | .63 AX 27° | .52 AX 39° |
| 30° | .66 AX 40° | .66 AX 50° | .75 AX 60° | 30° | .90 AX 37° | .87 AX 45° | .86 AX 54° |
| 45° | .79 AX 54° | .90 AX 62° | 1.06 AX 68° | 45° | 1.03 AX 52° | 1.11 AX 58° | 1.25 AX 64° |
| 60° | .90 AX 67° | 1.09 AX 72° | 1.30 AX 75° | 60° | 1.14 AX 66° | 1.32 AX 70° | 1.47 AX 73° |
| 75° | .98 AX 79° | 1.21 AX 81° | 1.45 AX 83° | 75° | 1.22 AX 78° | 1.46 AX 80° | 1.69 AX 82° |
| 90° | 1.00 AX 90° | 1.25 AX 90° | 1.50 AX 90° | 90° | 1.25 AX 90° | 1.50 AX 90° | 1.75 AX 90° |
| 105° | .98 AX 101° | 1.21 AX 99° | 1.45 AX 97° | 105° | 1.22 AX 102° | 1.46 AX 100° | 1.69 AX 98° |
| 120° | .90 AX 113° | 1.09 AX 108° | 1.30 AX 105° | 120° | 1.14 AX 114° | 1.32 AX 110° | 1.47 AX 107° |
| 135° | .79 AX 126° | .90 AX 118° | 1.06 AX 112° | 135° | 1.03 AX 128° | 1.11 AX 122° | 1.25 AX 118° |
| 150° | .66 AX 140° | .66 AX 130° | .75 AX 120° | 150° | .90 AX 143° | .87 AX 135° | .86 AX 126° |
| 165° | .55 AX 158° | .40 AX 146° | .39 AX 127° | 165° | .79 AX 160° | .63 AX 153° | .52 AX 141° |
| 180° | .50 AX 180° | .25 AX 180° | 0 | 180° | .75 AX 180° | .50 AX 180° | .25 AX 180° |
| OPHTHALMOMETER READING −1.50 AXIS | | | | OPHTHALMOMETER READING −2.00 AXIS | | | |
| OPH. AX. | PA−.25 AX 90° | PA−.50 AX 90° | PA−.75 AX 90° | OPH. AX. | PA−.25 AX 90° | PA−.50 AX 90° | PA−.75 AX 90° |
| 0° | 1.25 AX 0° | 1.00 AX 0° | .75 AX 0° | 0° | 1.75 AX 0° | 1.50 AX 0° | 1.25 AX 0° |
| 15° | 1.29 AX 18° | 1.10 AX 22° | .93 AX 27° | 15° | 1.79 AX 17° | 1.60 AX 20° | 1.40 AX 23° |
| 30° | 1.39 AX 35° | 1.33 AX 40° | 1.26 AX 45° | 30° | 1.89 AX 33° | 1.80 AX 37° | 1.70 AX 41° |
| 45° | 1.52 AX 50° | 1.58 AX 54° | 1.67 AX 58° | 45° | 2.02 AX 49° | 2.06 AX 52° | 2.13 AX 55° |
| 60° | 1.64 AX 64° | 1.81 AX 67° | 1.93 AX 70° | 60° | 2.13 AX 63° | 2.29 AX 66° | 2.41 AX 68° |
| 75° | 1.72 AX 77° | 1.95 AX 79° | 2.18 AX 80° | 75° | 2.22 AX 77° | 2.44 AX 78° | 2.67 AX 79° |
| 90° | 1.75 AX 90° | 2.00 AX 90° | 2.25 AX 90° | 90° | 2.25 AX 90° | 2.50 AX 90° | 2.75 AX 90° |
| 105° | 1.72 AX 103° | 1.95 AX 101° | 2.18 AX 100° | 105° | 2.26 AX 103° | 2.44 AX 102° | 2.67 AX 101° |
| 120° | 1.64 AX 116° | 1.81 AX 113° | 1.93 AX 110° | 120° | 2.12 AX 117° | 2.29 AX 114° | 2.41 AX 112° |
| 135° | 1.52 AX 130° | 1.58 AX 126° | 1.67 AX 122° | 135° | 2.02 AX 131° | 2.06 AX 128° | 2.13 AX 125° |
| 150° | 1.39 AX 145° | 1.33 AX 140° | 1.26 AX 135° | 150° | 1.89 AX 147° | 1.80 AX 143° | 1.70 AX 139° |
| 165° | 1.29 AX 162° | 1.10 AX 158° | .93 AX 153° | 165° | 1.79 AX 163° | 1.60 AX 160° | 1.40 AX 157° |
| 180° | 1.25 AX 180° | 1.00 AX 180° | .75 AX 180° | 180° | 1.75 AX 180° | 1.50 AX 180° | 1.25 AX 180° |

TABLES GIVING CYLINDER POWER AND AXIS RESULTING FROM CORNEAL ASTIGMATISM OF VARYING AXIS AND POWER (−.25 TO 2.00 DIO) AND PHYSIOLOGIC ALLOWANCE OF VARYING POWER (−.25 TO −.75 AX 90). ALL CYLINDER POWERS ARE EXPRESSED IN MINUS QUANTITIES. THE VALUES IN THESE TABLES WERE DETERMINED BY GRAPHIC CONSTRUCTION

reading and P the allowance for the physiological astigmatism in minus diopters. R expresses the power of the resultant cylinder while the angle beta measures its deviation from the vertical meridian.

The resulting cylinder was found for ophthalmometric readings increasing from —.25 D to —2.00 D and physiological astigmatism from —.25 D to —.75 D. The data are assembled in Table II and Figures 4 and 5. On the abscissae of the graphs are marked the axes of the ophthalmometer readings. The ordinates of the lower parts give the power and that of the upper parts, the axis of the resultant correcting cylinder. The graphs show clearly that, depending upon the dioptric power of the corneal readings and the physiological allowance, the final correcting cylinder will be increased and its axis inclined in the direction of vertical meridian.

The modifications of the ophthalmometric readings discussed in the first two parts of this paper are purely optical considerations.

The third part is added to the original paper and deals with the change in spatial perception often found with a dioptric difference in the horizontal meridians of the two corrective lenses or by oblique corrective cylinders.

This effect has been recognized and described by Adelbert Ames, Jr., in the early stage of his work on aniseikonia. A complete and brilliant mathematical analysis can be found in the paper, "Distortion of Stereoscopic Spatial Localization" by Paul Boeder and Kenneth N. Ogle published in the JOURNAL OF THE OPTICAL SOCIETY OF AMERICA, August, 1948.

For the sake of simplicity it shall be assumed that the vertical meridians be of equal power and a minus cylinder axis 90 is then placed before the left eye. The effect of such a condition can be demonstrated by means of a simple stereoscopic card. The vertical lines

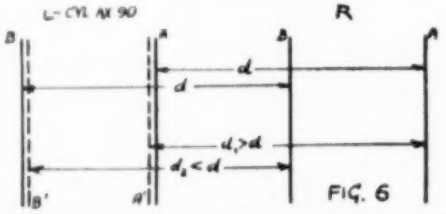


FIG. 6

A and B of Figure 6 shall represent the limiting lateral edges of a wall panel parallel to the facial plane as seen by the right and the left eye respectively. As long as the distances d between the corresponding lines are equal the two will appear equidistant from the observer when

viewed by means of a stereoscope. With the introduction of the minus cylinder axis 90 before the left eye the distance between the A lines will be broadened while that distance between the B lines will be shortened. Viewing the card now stereoscopically will show line A receded and line B advanced so that the panel appears rotated around a vertical axis in the direction of the eye wearing the minus cylinder. If this same idea is applied to the floor and the ceiling, assuming that the lines A and B represent the lateral limits of a panel, it will again be observed that the left side of the floor as well as of the ceiling will be rotated up or down respectively in the direction of the eye wearing the minus cylinder axis 90. As the tilts of the opposite wall, of the ceiling and of the floor are obviously equal in magnitude the left side of the room appears to be closer while the right side seems to recede. The room will thus appear as depicted in Figure 7. Such cases in practice rarely complain

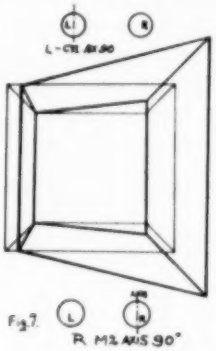
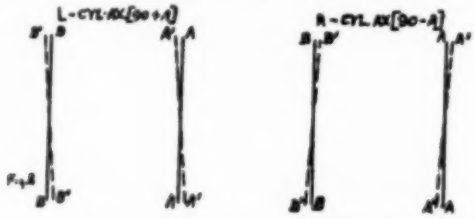


Fig. 7.

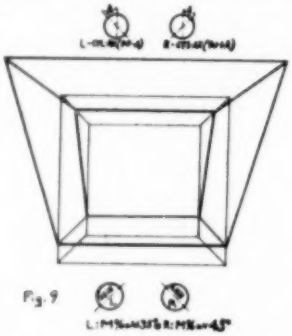
about the rotated appearance of the wall parallel to the facial plane. Seemingly the acceptance of true vertical walls is so ingrained that a mental compensation offsets the stereoscopic effect of the lens. The patient is, however, often acutely aware of the tilt of horizontal planes such as the floor, table tops, etc. Depending upon the magnitude in the change of the prescription, the age of the patient and many other factors such as temperament and the nature of his daily work, adaptation may or may not lead to compensation. It is not uncommon that binocular comfort can be restored only by a drastic reduction: in one particular case, 1.25 D. of the power of the cylindrical component at the expense of uniocular visual acuity.

To demonstrate the effect of oblique cylinders it shall be assumed that the minus cylinders are equal in power and the axes at (90 + A) before the right eye and (90 — A) before the left eye. Due to the

resultant prismatic effect a minus cylinder rotated around its axis causes a vertical line observed through the lens to be rotated in the



same direction. Figure 8 shows the effect of two rotated minus cylinders upon a pair of vertical lines limiting a panel on a plane parallel to the facial plane of the observer. The lines seen by the right eye rotate clockwise while the lines seen by the left eye rotate counter-clockwise. The upper ends will stereoscopically appear to be far away while the lower ends will appear close and thus the panel will appear tilted around its horizontal axis with its lower end forward. The sides of a rectangular room will be affected similarly so that they appear to converge at the bottom in the same sense as the axes of the rotated minus



cylinders. (See Figure 9.) So long as the rotation of the two cylinders is symmetrical there will be no tilting of the floor and the ceiling but the former will appear closer and the latter farther away. The patient may have the impression of walking on his knees. Should he tilt his head forward to look at the floor thus bringing it more or less parallel to his own facial plane then the floor will appear tilted up at his feet and down at the far end. The opposite effect will be observed when the axes of the cylinders are converging on top instead of at the bottom of the lens. (See Figure 10.)

A practical procedure to demonstrate and investigate the magnitude

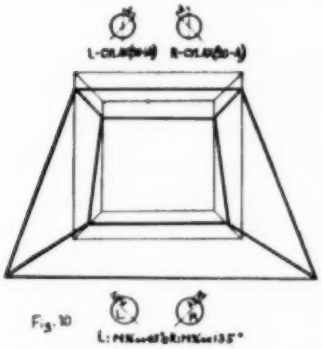


Fig. 10

of the spatial distortion is to let the standing patient observe the room and particularly the floor through the correction set in the trial frame. His spatial distortion is predictable and can be modified by varying slightly either the powers or the axes or both of the corrective cylinders. As always, the aim of the refractionist must be to achieve a balance of vision and comfort.

Summing up it shall be pointed out that neither the first two parts, and obviously not the third part, are offered as rules. The integration of all uniocular and binocular data and clues constitute the art of refraction. This art is closely related to experience. The acquisition of experience can be greatly enhanced by a conscious knowledge of all pertinent factors. It is for this reason that a thorough teaching of these factors is highly recommended.

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## *ABSTRACTS*

INFLUENCE OF ALCOHOL ON FUSION. Lord Charnwood. British Journal of Ophthalmology. 34:12.733-736. 1950.

The diplopia frequently experienced upon the consumption of sufficient alcohol has been considered by some to be due to toxic exotropia such as seen in the early stages of anaesthesia. However, the work of Powell and Colson have shown that the effect of alcohol on lateral heterophorias is to cause a slight reduction of exophoria, or a slight increase of esophoria. The author confirmed these findings but he did not find that alcohol had any effect in vertical phorias. He assumed that a reduction in the subject's fusional amplitude seemed a likely cause for alcoholic diplopia.

In order to test this assumption, four subjects, free from ocular discomfort, consumed five doses of one fluid ounce of gin, spaced at 15 minute intervals. The vertical fusional amplitudes were taken at the beginning of the experiment and 15 minutes after each dose had been consumed.

The findings indicated that the subjects' power of overcoming vertical prisms was gradually but markedly reduced—(from a total range of 6$\Delta$ to 2$\Delta$)—following the consumption of alcohol.

The author concludes that alcohol diplopia is the result of two factors: (1) reduction in the subject's power of overcoming any heterophoria that may be present, and (2) an increase in the difficulty of suppressing the diplopic image.

ROBERT E. BANNON

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# A NOTE ON ABNORMAL CORRESPONDENCE*

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At a meeting of the Section on Orthoptics of the American Academy of Optometry, at the last (1952) meeting of the Academy, the question of proper definitions again came up for discussion. The sub-committee had reported some progress in standardization of terms. But it was felt by the membership that perhaps it was not sufficient for the time spent. The perennial bugbear of retinal correspondence again came to the fore, and I was interested to note a similar confusion of thought amongst optometrists as I had noted at an ophthalmological meeting amongst ophthalmologists a few months previously.

The confusion arises from the fact that there are two phases of normal and abnormal correspondence which must be distinguished. Whether to call the phenomenon "retinal" correspondence or "cerebral" correspondence is of minor importance. The effect of correspondence, which refers primarily to localization of objects in space, is certainly a psychic process. But it is equally certain that this mental process is subserved by the retinal elements. Their innate directional value has been beautifully discussed by Dr. Gordon L. Walls of the University of California. But in order to avoid unnecessary strife, let us refer to the phenomenon as simply normal and abnormal (anomalous) correspondence.

The two phases of *normal* correspondence are these. Phase one: The two macular images are projected (mentally referred) to the same point in space. They are also fused into one impression if the two images are of the same object, or of objects which can be fused as in a stereoscope. They are superposed if the images are "compatible" (e.g., bird in a cage). If they are not compatible for superposition, one image is suppressed (retinal rivalry). But basically the important thing to note is that normally we have bi-macular superposition, the two macular images are superposed in space.

Phase Two. A macular and non-macular (para-macular) image are projected to *different* points in space. That is, there is macular-para-macular *separation* of images, even if the images are of the same object, as is easily shown by a displacing prism. The term "paramacular"

*Submitted on January 15, 1953, for publication in the June, 1953, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

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here refers to a region sufficiently far from the macula so as to be outside of Panum's area.

The two phases of *normal* correspondence have their counterpart in two phases of *abnormal* correspondence. Phase one—the two macular images are projected (mentally referred) to different points in space, that is, we have bi-macular *separation* of images. Phase two—the macular and paramacular images are projected to the *same* point in space. That is, we have macular-paramacular *superposition* of images.

A patient with abnormal correspondence may have only phase one abnormal, or only phase two abnormal, or have both phases abnormal. The tests for correspondence are different for the two phases, and one must note just what he is testing.

A word about the term "false macula." This is best reserved for something that has no relation to normal or anomalous correspondence. Occasionally, an eye whether straight or already in a position of squint, will turn still more to "fixate" an object when the other eye is covered. This merely shows that the vision of the macular and paramacular areas is worse than that of some more peripheral part, which is selected for a sort of vicarious "fixation."

*Summary.* There has been some confusion in the concept of normal and abnormal (retinal) correspondence because of overlooking the fact that there are *two phases* to each type of correspondence. In normal correspondence, phase one refers to bi-macular *superposition* of images at the same place in space. Phase two refers to the macular-paramacular *separation* of images in space. In abnormal correspondence, phase one refers to bi-macular *separation* of images in space, and phase two refers to macular-paramacular *superposition* of images in space. The tests for these two phases are different.

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# RESEARCH IN OCCUPATIONAL SEEING*

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## INTRODUCTION

There are several different kinds of research. A few kinds of research might be mentioned. There is: 1. Descriptive research: 2. Historical research: 3. Experimental research: 4. Philosophical research: 5. Predictive or prognostic research: 6. Sociological research: 7. Creative research.

Without defining each of these types of research, it may be said that the materials of this paper can readily be classified as a combination of descriptive, experimental and predictive research. Descriptive because the fact-finding approach is stressed and attempts to answer the questions —*how* is visual performance of industrial workers related to numerous criteria of job success: and can the information, here presented, be used to stimulate better work efficiency in industrial and commercial organizations in general. Experimental because certain visual factors are isolated for measurement and raises the question, what further facts need to be secured for the subsequent elaboration of these findings. Predictive because it points-up probable future findings when these visual factors are investigated and raises the question, what inevitable things may be controlled more completely on the basis of present knowledge leading to a more comprehensive analyzed trend of the occurrence of visual factors to work success and to safety.

In way of introduction, several needed human characteristics incident to research should be enumerated, characteristics not only essential for the research worker but for the persons making use of such research. Research persons and consumers of research should possess a belief in it, tolerance in abundance, and a constructive attitude and humility.

Despite the many demonstrated potential benefits which many industries have gained from a visual performance program, industrial executives and some professional men have not accepted the idea nor seem to believe in it. Desirable belief means that, when faced with

*Read before the annual meeting of the American Academy of Optometry, Section on Occupational Optometry, Rochester, New York, December 9, 1952. For publication in the June, 1953, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.
†Ph.D.

technical problems, we habitually seek answers with an open mind and critical experimentation rather than with prejudice, opinion, or some mystical art.

Attitudes are fundamentally as important as beliefs, and they are symbolic of the success or failure of an education to contribute the lasting marks of an educated man.

Tolerance is needed because many of us are aware of the problems that arise when the results of theoretical determinations are first explored at a practical level. Any failures do not necessarily connote a lack of soundness of work done at the fundamental level but rather point to the need of additional research at the applied level.

Humility is to be regarded more highly than authority, in all fields of endeavor, and research is no exception.

These studies, which I shall report, may properly be designated as research. But this is research redefined, because these studies have to be made for highly practical purposes. They are practical since they have already influenced attitudes of industrial executives where these studies were made. They have been used to encourage employees who need professional services to do something about it. They have been used to make employees aware of the benefits of efficient visual performance in job efficiency and in quality of work.

## STUDIES DEALING WITH PRODUCTIVE EFFICIENCY

One purpose of this discussion is to review the part which specific visual factors play in productive efficiency. Tangible objective data are available from 35 studies which have been conducted in 35 various types of industrial plants and in different parts of the country.

In these industrial plants certain controls were used, controls in visual studies which, I believe, were never before used in such a large variety of industrial plants and at widely distributed parts of the country. In every instance, visual performance scores of the employees were obtained on the same visual performance instrument by trained examiners. In every instance, these studies were directed by the speaker and were carried to completion through the cooperation of personnel directors, training directors, quality control men, safety engineers and many other persons.

Besides identical instrumentation for measures of visual performance, a constancy of procedure offered a control perhaps never before attempted in this field. Had these studies been directed by different individuals, it is easy to see how variations could have manifested themselves. In these studies, a single person controlled the research

approach, and utilized relatively constant methods in the manipulation of criteria used.

TYPES OF INDUSTRIAL PLANTS WHERE STUDIES WERE MADE

Table I contains a list of the various types of industrial plants in which studies were made. This list, covers a wide variety of industries, from heavy machine construction to miniature armature winding. For instance, 22 per cent were textile plants. Ten per cent were public service, containing bank service, a governmental agency and telephone service. The frequency of other plants is listed.

CRITERIA RELATED TO VISUAL PERFORMANCE IN THESE PLANTS

Table II contains a listing of all the various criteria used for these studies. Since 96 different criteria are listed for these 35 plants, two criteria were used in nearly every plant with some three or four available in some plants.

This variation in criteria is obvious when we point out that industrial plants, in most instances, suggested the areas for studies. We prefer not to tell industrial plants what criteria wou.d be most helpful to them in painting a picture of the place of visual performance for workers. So, executives in these industrial plants suggested what criteria they wished to use in order to determine the effectiveness of visual performance for their workers. The writers responsibility was to follow through and secure data in areas which would benefit each plant to the greatest extent.

PRODUCTION CRITERIA RELATED TO SPECIFIC VISUAL FACTORS

Specific visual tests in the Ortho-Rater were related to these 96 different criteria of production. An analysis was made on the basis of critical scores on each of the nine visual tests in the battery. By the critical score is meant the specific visual score on any test which differentiates best between a *high* criterion group and a *low* criterion group. In this paper, we are interested in this differentiation between the *high* and the *low* criterion group at the critical score level on each visual test studied. The differentiation figures which will be reported are based on the 96 different criteria. The results are based on individual records for over 3500 employees.

Obviously, it would be impossible to show separate differentiation figures for each of these 96 criteria and for each of the visual performance tests. The best that can be done is to report figures for only several individual comparisons.

Figure 1 shows one of the 96 basic tables for a single criterion. Employees on this Tap and Die Operation were divided into two groups,

TABLE I. TYPE OF INDUSTRIAL PLANT IN WHICH OCCUPATIONAL VISION STUDIES WERE MADE

| | No. | Per Cent |
|---|---|---|
| Textiles | 8 | 22% |
| Public Service | | |
| Bank | (2) | |
| Government Agency | (1) | |
| Telephone | (1) | |
| | 4 | 10% |
| Radio | | |
| Electrical Tubes | (1) | |
| Min. Armatures | (1) | |
| Radio Sets | (1) | |
| | 3 | 8% |
| Hosiery | 2 | 6% |
| Playing Card Manufacturing | 2 | 6% |
| Can Manufacturing | 2 | 6% |
| Surgical Materials and Corsets | 2 | 6% |
| Tap and Die Manufacturing | 1 | 3% |
| Cash Registers | 1 | 3% |
| Wool Combing | 1 | 3% |
| Wire and Cable Manufacturing | 1 | 3% |
| Airplane Parts | 1 | 3% |
| Glove Manufacturing | 1 | 3% |
| Roller Bearing Manufacturing | 1 | 3% |
| Brass Tubing | 1 | 3% |
| China | 1 | 3% |
| Heavy Machinery Manufacturing | 1 | 3% |
| Ladies Hand Bags | 1 | 3% |
| Rubber Goods Manufacturing | 1 | 3% |
| Totals | 35 | 100% |

the high earners and the low earners. The high group earned from $1.30 through $1.74 an hour, while the low group earned from 85 cents through $1.29 per hour. In every one of these 96 criteria, a distinct differentiation between the high and the low group was determined.

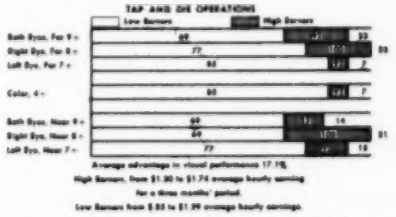


Fig. 1. Earnings and vision. Tap & Die plant.

You will note that binocularly, with fixation at distance, 92 per cent of the high earners reached or excelled a level of nine or better on the Ortho-Rater, while only 69 per cent of the low earners did as well.

TABLE II. CRITERIA USED FOR OCCUPATIONAL VISION STUDIES

| | No. | Per Cent |
|---|---|---|
| *Production:* | | |
| Earnings | (19) | |
| Bonus hours | ( 1) | |
| Point hours earned | ( 3) | |
| Pieces produced | ( 6) | |
| Per cent efficiency | ( 5) | |
| | 34 | 35% |
| *Quality:* | | |
| Spoiled work produced | ( 6) | |
| Errors | ( 5) | |
| Supervisor's judgment | ( 1) | |
| | 12 | 13% |
| *Inspection:* | | |
| No. of complaints per machine returned | ( 3) | |
| Bad work | (15) | |
| | 18 | 19% |
| *Ratings:* | | |
| Comparative | ( 7) | |
| Progress Report | ( 6) | |
| Forced distribution | ( 2) | |
| Supervisory | ( 2) | |
| Ranking (top to bottom) | ( 1) | |
| | 18 | 19% |
| *Training Costs:* | | |
| Make-up pay | ( 3) | |
| Days required to reach standard per cent efficiency | ( 1) | |
| | 4 | 4% |
| *Absence From Work* | ( 8) | |
| Sick Pay | ( 1) | |
| | 9 | 9% |
| *Turnover* | 1 | 1% |
| Totals | 96 | 100% |

This level of visual performance was present among the high group earners twenty-three per cent more frequently. A 23 per cent advantage for the high criterion group was also found for the right eye, at distance. A 31 per cent advantage for the high criterion group for the right eye, at near is also indicated. There was an average visual performance advantage of 17.1 per cent for all the tests.

Let us look at another example shown in Figure 2. This represents the visual performance advantage for the high criterion group when quality of work was considered for this same group of employees. Quality here means little bad work of $19.00 or less, or much bad work of $20.00 through $293.38, for a three-month period. Binocu-

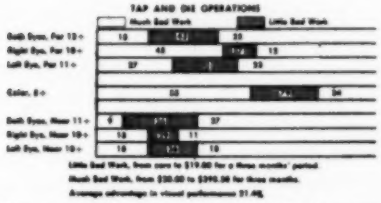


Fig. 2. Quality of work. Tap & Die plant.

larly at distance the low bad-work group had a 25 per cent better record than did the high bad-work group. Binocularly at near, there was a 27 per cent advantage. For the battery, we have an average of 21.4 per cent greater frequency of visual performance status for the better quality group.

TABLE III. PRODUCTION STUDIES

Summary Table showing (I) Ortho-Rater tests, (II) The percentage of all criteria which indicate positive advantages of better vision for the better workers for each visual performance test, (III) Range of percentage advantages at critical score levels for all criteria, and (IV) The average advantage of visual performance for critical score levels for all criteria. (35 on-the-spot studies, using 96 different criteria.)

| I | II | III | IV |
|---|---|---|---|
| Both Eyes, Far | 100 | 5-75 | 24 |
| Right Eye, Far | 98 | 2-75 | 24 |
| Left Eye, Far | 95 | 1-80 | 26 |
| Depth | 88 | 4-67 | 24 |
| Color | 75 | 3-67 | 21 |
| Both Eyes, Near | 96 | 1-80 | 24 |
| Right Eye, Near | 88 | 0-75 | 24 |
| Left Eye, Near | 90 | 2-87 | 26 |
| Lateral Phoria, Near | 67 | 2-83 | 25 |
| Substracted from Lateral Phoria, Far | | | |
| • • • | | | |
| All visual tests combined for 96 different criteria | | 9-57 | 23 |

The data in Table III are for 96 criteria, relative to the following factors:

1. The percentage of times that the high criterion group possessed better visual performance over the lower group for all 96 criteria and on each visual test.

2. An average differentiation figure for each visual test for the 96 different criteria.

3. A range of differentiation for each visual test.

STEREOPSIS OR DEPTH PERCEPTION

These studies have shown that other visual factors besides acuity are important for employee success. First consideration will be given to the trends established for stereopsis or depth perception. On 88 per

cent of the 96 criteria, depth has shown definite positive trends in favor of the better workers, the better workers possessing satisfactory depth perception 24 per cent more frequently than did the poorer workers. The range of differentiation on separate criteria was four per cent through 67 per cent. It might be suggested that depth perception, as measured by the Ortho-Rater, is not a gross factor but is a highly refined test as compared with other similar tests which purport to measure this factor. In fact, the test here used begins, we believe, where most of the depth perception tests leave off.

COLOR TEST

The Color test showed positive trends in favor of the better workers on 75 per cent of the 96 criteria. On the average, the better workers had satisfactory color perception 21 per cent more frequently than did the poorer workers. The range of advantage was three through 67 per cent.

BOTH EYES AT DISTANCE

One hundred per cent of the time, both eyes, at distance, indicated a positive trend of satisfactory scores in favor of the better workers when related to the poorer workers, with a range of advantage from five per cent through 75 per cent. On the average, the better workers possessed satisfactory visual performance 24 per cent more frequently than did the poorer workers.

RIGHT EYE AT DISTANCE

On 98 per cent of all criteria groups, right eye at distance showed positive trends in favor of better workers as related to poorer workers, the range being two through 75 per cent. On the average, satisfactory visual performance was present 24 per cent more frequently in the better than in the poorer workers.

LEFT EYE AT DISTANCE

On 95 per cent of all criteria, left eye at distance showed positive trends indicating that the better workers had satisfactory visual performance more frequently than did the poorer workers. The range of advantages spread from one per cent through 80 per cent. On the average, satisfactory visual performance was present 26 per cent more frequently in the better than in the poorer workers.

BOTH EYES AT NEAR

On 96 per cent of all the criteria used, there was a trend in favor of better visual performance on both eyes at near for the better workers as related to the poorer workers. In fact, satisfactory visual performance

was present in the better workers 24 per cent more frequently than in the poorer workers. These positive trends on specific criteria range from one per cent through 80 per cent.

RIGHT EYE AT NEAR

On 88 per cent of these criteria, right eye at near had a positive trend for the better criteria group as compared to the poorer group: 24 per cent of the time in satisfactory visual performance; the range being from zero through 75 per cent.

LEFT EYE AT NEAR

Left eye at near showed positive trends of better visual performance on the average, for the better workers in 90 per cent of the criteria groups. The better workers excelled the poorer workers in satisfactory visual performance 26 per cent more frequently than did the poorer workers.

LATERAL PHORIA—NEAR FROM FAR

Lateral phoria scores, near from far, showed positive trends in favor of better producers on 67 per cent of the various criteria. The better producers had apparently better relationships between near and far lateral phoria in 25 per cent of the employee population, with a range from two through 83 per cent.

ENTIRE BATTERY OF TESTS

Twenty-three per cent greater frequency of adequate visual performance was found on the accumulated 96 criteria for the entire battery of tests.

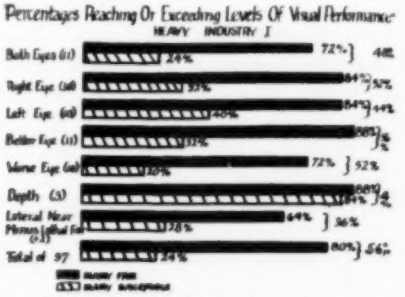


Fig. 3. Percentages reaching or exceeding levels of visual performance. Heavy industry.

This covers the summary concerning 35 studies using 96 different production criteria from various industrial plants of the country. Next, I think we should briefly review the summary data relative to visual performance and various safety criteria. Table IV covers these data.

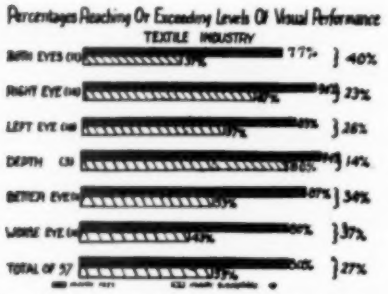


Fig. 4. Percentages reaching or exceeding levels of visual performance. Textile industry.

These studies were performed at the various points in the country. Safety studies were performed in thirty-six different industrial plants.

It might be well to look at a few individual studies. Figure 3 shows results from a heavy industry. Figure 4 shows results from a textile mill. Sometimes it is said that visual performance is important where near-point work is essential but visual performance is likely not a requisite in a textile mill, so far as safety is concerned.

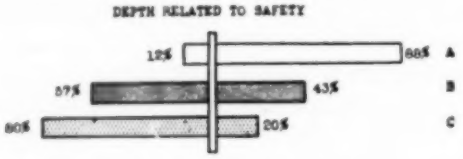


Fig. 5. Depth related to safety.

Figure 5 shows relationship of visual performance on depth perception for an accident-free group, a high frequency of minor accident group, and a serious injury group. Here we see that 88 per cent of the accident-free group passed the test, 43 per cent of the high frequency of minor accident group did as well visually, while only 20 per cent of the serious injury group did as well visually.

Figure 6 shows the same three groups relative to lateral phoria—

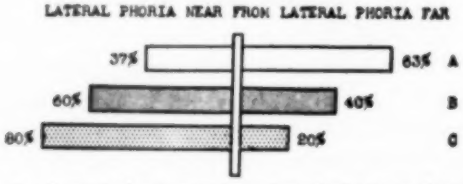


Fig. 6. Lateral phoria near from lateral phoria at distance.

near scores subtracted from far scores. Here visual efficiency is represented by 63 per cent for the accident free, 40 percent for the minor accident group, and 20 per cent for the serious injury group.

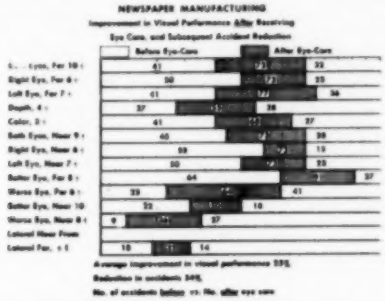


Fig. 7. Visual performance before and after correction. Paper plant.

Figure 7 shows the effect of professional services on a group of men in a paper manufacturing plant. These results show visual performance *before* correction and *after* correction.

TABLE IV. SAFETY STUDIES

Summary Table showing (I) Visual Performance Tests. (II) Percentage of plants in which zero or low-accident workers excel accident-experience workers. (III) Range of advantages in visual performance for the accident-free or low-accident groups over the accident-experience groups. (IV) Average excellence in visual performance for the accident-free in all plants. (36 on-the-spot studies.)

| I | II | III | IV |
|---|---|---|---|
| Both Eyes, Far | 94 | 5-47 | 25 |
| Right Eye, Far | 96 | 6-62 | 24 |
| Left Eye, Far | 92 | 5-54 | 25 |
| Depth | 93 | 0-47 | 21 |
| Color | 79 | 5-29 | 17 |
| Both Eyes, Near | 95 | 5-50 | 21 |
| Right Eye, Near | 92 | 0-62 | 17 |
| Left Eye, Near | 82 | 0-47 | 22 |
| Lateral Phoria, Near Subtracted from Lateral Phoria, Far | 89 | 0-50 | 18 |

LATERIA PHORIA DISCUSSION

It has been found by repeated studies that employees with higher far scores and lower near scores are more successful workers and accumulate fewer accidents. What is meant by a higher far score and a lower near score is shown in Figure 8. For instance, if the employee has a score of "12," at far, and a score of "8," at near, a positive score of "4" is recorded, represented by the line at the right of the card. If, on the other hand, the employee has a score of "5" at far, and a score of

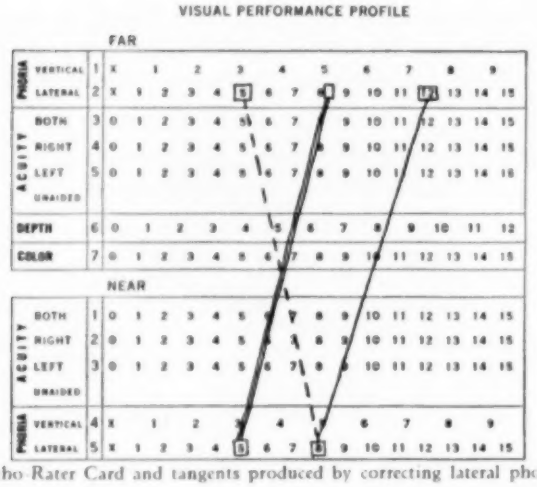


Fig. 8. Ortho-Rater Card and tangents produced by correcting lateral phoria near and far scores.

"8" at near, a negative score of "3" is recorded, represented by the line at the left of the card. These recorded scores, a positive if the far one is above the near score, and a negative, if the far score is below the near one, represent the relative mathematical differences in scores between lateral phoria at far, and at near. Employees tend to be better producers and to have fewer accidents if the line forms a tangent to the left, rather than to the right.

Even though these comparisons are made in industrial situations only by the use of scores on the Ortho-Rater card, it might be well to state that at both far and near the mathematical Ortho-Phoria is designated by the double line on the profile chart. The mathematical orthophoria at 26 feet is indicated by a score between "8" and "9." The visual axes converging on a point 13" from the eyes, is indicated by a score of "5."

The mean score, at distance, on several groups of individuals was indicated by a score of "8," this being the approximate mathematical orthophoria. The mean lateral phoria score, at near-point, for these same people was also an approximate score of "8." A score of "8," at far, represents an approximate mathematical orthophoria, while a score of "8," at near, represents approximately 4.5 D. of exophoria.

It has been observed in repeated studies that in 35 companies out of 41, or 85 per cent of the time, critical scores were positive and in six out of 41, or 15 per cent, they were negative, the most frequent

critical score concentrating at a positive score of "1." These observations have created considerable curiosity.

Why these trends show greater positive trends for the good criteria groups, I will not attempt to answer. My only purpose is to indicate that there is a possibility that by these differences in scores between far and near, we may eventually add one more "power" test to our battery on the Ortho-Rater which will differentiate between good and poor workers. This may be accomplished by making use of the tests already there, rather than the construction of any new one.

An illustration may further clarify the procedure. A group of employees, all working on the same job, were studied *before* and *after* correction to observe what changes in scores resulted and what trends in differences between far and near lateral phoria resulted. The majority of these employees were wearing correction *before* but were referred for further professional attention since they did not meet this visual standard for this job.

Nothing is known about the corrections these employees had since *that* is not a part of this report. My purpose is merely to offer some statistical data of the extent of the relationship of far and near lateral phoria scores to production efficiency and to safety. I will merely refer to relative scores at far and at near, and in the next figure of this series, will point out the relative scores at far and at near.

Figure 9 at top shows far lateral phoria scores *before* and *after* professional services. It will be noted that seven out of these ten employees either remained at the same score or increased their scores, while

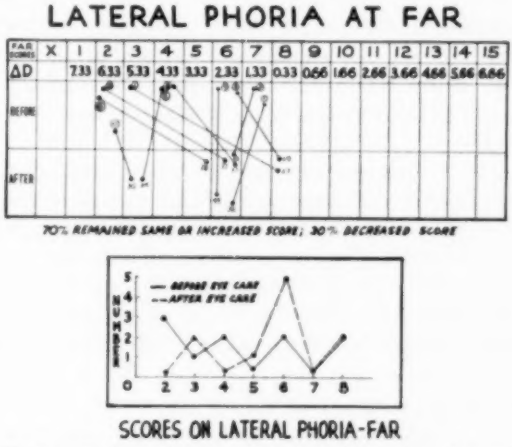
LATERAL PHORIA AT FAR
FAR SCORES
X 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
ΔD 7.33 6.33 5.33 4.33 3.33 2.33 1.33 0.33 0.66 1.66 2.66 3.66 4.66 5.66 6.66
BEFORE
AFTER
70% REMAINED SAME OR INCREASED SCORE; 30% DECREASED SCORE
— BEFORE EYE CARE
--- AFTER EYE CARE
NUMBER
5 4 3 2 1 0
2 3 4 5 6 7 8
SCORES ON LATERAL PHORIA-FAR

Fig. 9. Far lateral phoria, before and after professional services were given.

only three decreased their scores. The chronological ages of the employees are indicated at the lower end of the bars.

At the bottom of Figure 9 is a chart of these same employees showing the trend *before* and *after* professional services. It will be noted that with a new correction the trend is toward the upper end of the scale. Obviously, many factors enter into these changes, but whatever these results mean I prefer to leave to the professional man. I am merely interested in pointing out a trend.

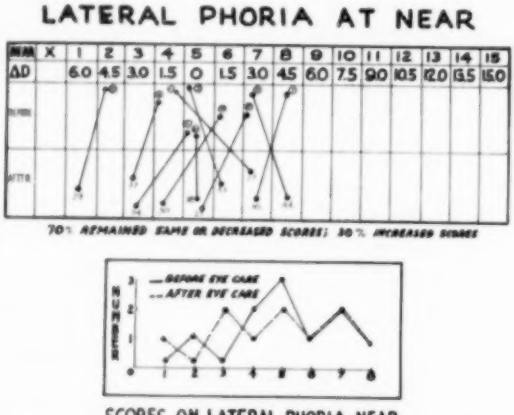
LATERAL PHORIA AT NEAR
MEAN X 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
ΔD 6.0 4.5 3.0 1.5 0 1.5 3.0 4.5 6.0 7.5 9.0 10.5 12.0 13.5 15.0
70% ATTAINED SAME OR DECREASED SCORES; 30% INCREASED SCORES
BEFORE EYE CARE
AFTER EYE CARE
SCORES ON LATERAL PHORIA-NEAR

Fig. 10. Near lateral phoria scores, before and after professional services were given.

Figure 10 at top shows the near lateral phoria score for this same group of employees *before* and *after* professional services. In this instance, seven of the ten employees remained at the same score or decreased their scores, while only three out of ten increased their scores. The graph at the bottom points up a slight trend toward the lower end of the scale.

Figure 11 at top pictures the differences between far and near lateral phoria *before* and *after* professional services. Seven employees moved toward the positive end of the scale after latest correction while only three moved toward the negative end. The bottom chart shows a rather definite trend toward the positive end of the scale so far as differences between far and near lateral phoria are concerned.

Industrial management is interested in the question, how has production been affected by this new correction? *Before* the new correction all these employees were producing on the average, 1.259 dozens per hour and *after* 1.511 dozens per hour. The three employees who tended

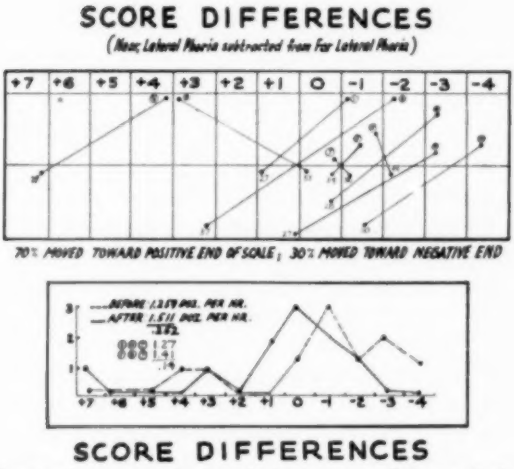
SCORE DIFFERENCES
(Near Lateral Phoria subtracted from Far Lateral Phoria)
+7 +6 +5 +4 +3 +2 +1 0 -1 -2 -3 -4
70% MOVED TOWARD POSITIVE END OF SCALE; 30% MOVED TOWARD NEGATIVE END
SCORE DIFFERENCES

Fig. 11. Differences in near and far lateral phoria scores. Before and after professional services.

toward the negative end of the scale had increased their production only .14 of a dozen, almost half that of those who moved toward the positive end of the scale.

From the repeated studies which have been made, it may be that by the use of these positive and negative scores on the lateral phoria tests, a power score is produced, which, on certain jobs, may be almost equally as effective in differentiating between good and poor workers as has been so consistently demonstrated for other power tests, such as acuity, depth, and color. For convenience, these lateral phoria differences may be regarded as "S" scores.

I hope to continue these studies on phorias in practical situations, and with your help and suggestions rise above the level of details here presented. It is a field of research which many should enter in order that more progress may be made beyond this present work. While definite trends on these lateral phoria relations are indicated, there is no complete satisfaction with the present status of these findings. Further data should be secured for subsequent elaboration. It is my belief that any visual test which seems directly related to efficiency in industrial work and in the schools should be vigorously followed-up by further investigation.

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# ANOMALOUS ANATOMICAL CONVERGENCE INSUFFICIENY—A CASE REPORT*

George P. Elmstrom†
El Segundo, California

## I. CASE HISTORY

### OCULAR HISTORY

Mr. E. R., 32, came to the office on January 24, 1953, to fill an appointment for a visual analysis. The patient reports that he first began wearing lenses in the third grade after he was hit across the forehead with a baseball bat. These first lenses were prescribed to eliminate or reduce clouds of red or black impressions while looking at the blackboard. These impressions were eliminated. The patient reported nc known history of headaches during these formative years. There is history of muscae voluntantes. At the beginning of high school the patient realized that there was something abnormal in regard to his color sense. He had difficulty in properly assigning names to the basic colors. Matching colors did not seem to offer Mr. E. R. a great deal of difficulty.

The most outstanding visual defect noticed by the patient occurred during the high school years when he found a pronounced blind area in his field between 1½ and 5 feet in front of him. This was made evident by ball playing such as catching a ball he would see it well until about 5 feet from his glove it would disappear: it would reappear within a fraction of a second 1½ feet from him.

In college the work was quite difficult and burdensome by an uncontrolable urge to stare at the printed page without comprehending the material and reading at extremely slow rates. During post-war (1946-48) collegiate work grades were maintained by carefully listening to every word and by minute planning of study lessons. Only short reading periods of 30 minutes were acceptable during this time. During professional school studies (Law) the reading required resulted in an exhausted condition comparable to a full day of strenuous work. On occasions when rapid reading was essential within 10 minutes the patient would break into a cold sweat. To eliminate these extremely difficult and frustrating moments, an over-head projector was used for reading with the page projected well beyond an arm's reach on a vertical screen. Previous difficulties discussed were completely absent upon

*Submitted on March 14, 1953, for publication in the June, 1953, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.
†Optometrist.

such projection-reading occasions. During these college years lenses were prescribed and used but the patient reported no relief whatsoever. He did not have them at the time he consulted the author so inspection of the spherical, cylindrical and possible prismatic components of the lenses could not be appraised.

HEALTH HISTORY

Patient reveals no pertinent information in regard to family history other than color deficiency observed with some relatives. The author completed an examination of the patient's son, aged 9, with no major visual symptoms evident.

SCHOOL HISTORY

The patient had always been an excellent student: he graduated with highest of honors from high school. However, the above enumerated conditions which led to frustration and discouragement compelled the patient to drop from law school.

OCCUPATION

The patient is a Civil Service Investigator (Federal). This vocation does not require as much near work as one may regard conventional for this type of work.

SOCIAL AND RECREATIONAL HISTORY

The patient leads the social life common to a small city.

COMPLAINT

The patient complains of severe discomfort at the near point. Reading has become an unbearable task after a few minutes. At this time the print seems to double, with one dark image and a second lighter image somewhat further away. Although present occupation does not necessitate extensive reading, advancements are nearly impossible without a more adequate reading duration, and social reading has become seriously neglected.

## II. PRELIMINARY FINDING

EXTERNAL EXAMINATION

External examination of the patient's lids shows a normal, healthy condition. The puncta are clean and evidently opened. The tarsal conjunctiva is normal, as well as the bulbar conjunctiva and sclera. The cornea is not involved in any pathological condition.

The iris has normal pigmentation; the pupil is round, smooth, and there are no adhesions.

PUPILLARY REACTION

The pupillary reaction, both direct and consensual, is normal.

Accommodative pupil reaction is normal: pupil reaction to convergence was impossible to observe since convergence was highly insufficient.

ROTATIONS AND VERSIONS

The two eyes beyond three feet move synergicly in all directions: within three feet the right eye follows accurately while the left eye is sluggish and inaccurate. Near point of convergence is two feet using a pen light in a room with medium illumination, the left eye diverging from the fusion position at this distance. The cover test shows a high exophoria at all distances, but particularly at near. The condition is not one of periodic strabismus but it is obvious that much effort must be exerted for clear single binocular vision.

The acuity finding at distance is 20/25 both eyes together as well as separately. Within an arm's reach diplopia was always evident which permitted only the measurement of near acuity on each eye while one was covered. This acuity at 16 inches was 20/20 O.D. and O.S.

III. OPHTHALMOSCOPIC INSPECTION

RIGHT EYE

The anterior and posterior chambers are of apparently normal depth and the aqueous is free of any opacities. The lens is clear and shows no evidence of opaqueness. The position of the lens is correct. The iris surface is smooth in texture and pigmentation. The fundus picture is one of general healthy condition without evidence of any kind of pathology nor of anomaly. The cupping is moderate with a small deposit of pigment along the temporal edge of the disc. The vessels are normal with arterioles slightly smaller in diameter than the venules. There is no evidence of tortuosity. The venules show no signs of indentation where they are crossed by the arterioles. There are no hemorrhages or areas of anemia.

LEFT EYE

The ophthalmoscopic examination of the left eye reveals a similar picture of ocular health. The corneal surface is smooth and the stroma clear. The anterior and posterior chambers are normal in depth and the aqueous is free of any particles. The fundus ground is red brick color with normal vessels in every manner. A comparable amount of physiological cupping is present.

1. The confrontation test performed by a medical pen light shows no marked constriction of the field in any meridian.
2. The transillumination of the eyes indicate no malignant condition.

3. The palpation test indicates no gross abnormality of intraocular pressure.

IV. ANALYTICAL EXAMINATION

1. Physiological diplopia—present at all distances.
2. Ophthalmometer
   O.D. 44.00 at 180 44.50 at 90 (meridian)
   O.D. 45.00 at 180 45.00 at 90
   by all ophthalmometer astigmatism rules approximate total astigmatism is negligible in right eye, absent in left eye.
3. Static retinoscopy (net), plano in both eyes.
4. Binocular subjective, plano in both eyes.
5. Phorias and ductions at distance (clinically), phoria is 4 exophoria. Base-out ductions are 16/24/3. Base-in ductions are x/16/12.
6. Binocular near tests not possible due to consistent suppression of the left eye.
7. Monocular plus lens to blur at 40 mm is +1.00.
8. Monocular minus lens to blur at 40 mm is —4.00.
9. Bielschowsky after image test indicates correspondence is normal.

V. ANALYSIS OF FINDINGS

It is evident from the findings that the source of the patient's discomfort is, in all probability, the imbalance at near. Since binocular tests at 16 inches could not be made because of the persistent suppression of the left eye conventional prism rules cannot be utilized. Orthoptics or vision training are generally of value in such cases as this in adolescents or young adults and are to be instituted rather than the immediate utilization of prismatic prescriptions. Since the patient chronologically is on the border of a true vision training case and definite prismatic case, appropriate training was instituted for an eight-week period to determine the acceptability of same.

The principal training element was home training cards requiring fusion within an arm's reach. By pulling the cards slowly toward the patient the positive relative reserve convergence function was increased since the separation was also increased. From a series of 24 basic cards the patient derived excellent results from 21. A home hand stereoscope was used with colored slides. The patient reported the normal responses when using this device.

While the patient demonstrated the increases in various functions at each office call the author noticed a definite dilation of the pupils dur-

ing the more frustrating attempts and a pronounced constriction of the pupils upon relaxing. This pupil variance was not observed during accommodative rock training.

The key element the writer believes in the training of any patient, but particularly a border-line case is the appropriate institution and later elimination of the training. After seven weeks the plateau of training gains was approached, after which further vision training would be of an unnecessary cost, of questionable result, and would in all likelihood lead to the immediate frustration of the patient. Discouragement on the part of many practitioners in regard to orthoptics is frequently due to the expectation of unreasonable gains: it is essential to observe the limitations as well as the decided advantages in many cases.

The types of convergence insufficiency which seem most amenable to correction by prisms fall in the anatomical category. Generally anomalous anatomical origin is determined by the fullfilling of three requirements, as:

1. Physiological phoria is exophoria rather than esophoria.
2. The readings and findings throughout successive examinations will be consistent.
3. Change of gaze will not appreciably alter findings and a possible fourth requirement observed by the author is a definite limitation as far as orthoptic gains—this limitation is considerably constricted when compared to similar problems of a functional origin.

A temporary prismatic correction was set up in a trial frame with base-in prisms and given to the patient with instructions to use this device when doing near work for four days and to return with a report on its effectiveness. The patient reported that this device with a uniocular prism of 8 prism diopters permitted the use of both eyes for near tasks for unlimited periods, and with complete comfort. The only objection elicited was the observation that the prism at times tended to distort the print with a coloration similar to the spectrum.

For temporary use the following prescription was given:

O.U. 3 prism diopter base-in plano prisms.

The patient was instructed that the coloration noticed with the trial prism would not be observed with the prescription which contained an accurate prismatic component, and equally divided between each eye.

## VI. PROGRESS REPORTS

The patient returned for progress reports after 10 and 30 days. Binocular near findings with the prescription in place were normal or

within normal limits recommended by Dr. Meredith W. Morgan, Jr. Suppression of the left eye did not manifest itself during the testing. The triangulation test without lenses was identical to the test completed as part of the initial investigation. However, this near point of convergence with lenses in place was four inches.

Analytical findings are quite meaningless in themselves and the patient as a whole must be considered. Consequently, the measure of success should not be the clinical findings alone (although this is an integral portion of the total picture) but of patient benefit. Mr. E. R. reported comfort, reading speed and comprehension, and general overall efficiency so increased that he is seriously considering re-entry in law school. With the lenses in place, although they are not a final prescription, his immediate obstacle of inability to do near work for more than very short intervals is removed. With the lenses off the face, he is essentially facing the same obstacle that has proved so frustrating and discouraging.

## VII. SUMMARY

The patient is a Civil Service Investigator, 32 years old. He complains of very severe discomfort while trying to do near work. This condition was particularly frustrating during college in which the patient attempted to make judicious compensations by using projectors to eliminate near work. This condition has resulted in the patient doing a very minimum of near work. Visual training was instituted to build the basic visual skills to ranges permitting the acceptance of an appropriate prismatic lens. Base-in plano prisms were then prescribed for all near point work.

325 RICHMOND STREET
EL SEGUNDO, CALIFORNIA

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# CORRESPONDENCE

## A FEELING OF DEEP PERSONAL LOSS

To the Editor: To me for nearly a decade our Journal, Carel Koch and Virginia Huck have been synonymous, and when reading in last month's issue of the Journal that Virginia was leaving this fine association I had a feeling of a deep personal loss. As Editor Koch states, we shall certainly miss her genial presence and efficiency at our annual meetings. May she continue to enjoy a most successful career.

J. FRED ANDREAE

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AMERICAN JOURNAL OF OPTOMETRY
*and* ARCHIVES *of*
AMERICAN ACADEMY OF OPTOMETRY
Established 1924

Vol. 30 June, 1953 No. 6

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Annual Subscription, United States and Canada, $6.00 in Advance; Foreign, $6.50. Single Copies 60c.

Original papers, scientific communications, clinical reports, books for review, and correspondence should be sent to the editor. Subscriptions and applications for single copies should be addressed to the circulation manager. Copy of advertisements must be sent in by the first of the month preceding their appearance. Communications with reference to advertising or other journal business should be addressed to the advertising manager. Academy correspondence should be addressed to Dr. Carel C. Koch, Secretary of the American Academy of Optometry.

Published Monthly by the
AMERICAN JOURNAL OF OPTOMETRY PUBLISHING ASSOCIATION

The American Academy of Optometry and the publishers of this journal have no objection to the reprinting by other magazines of any of the articles in this issue, provided such reprints are properly credited to the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

# THE CONTRIBUTION OF THE ACADEMY TO THE OCCUPATIONAL VISION FIELD*

A single decade has witnessed a remarkable acceptance of vision programs on the part of both schools and industry. The acceptance of vision-testing instrumentation has been not unlike that of the telephone in other phases of our daily living. Initially, the telephone was regarded with suspicion: then, it was some kind of toy—a gadget for the gadget-minded: then, it progressed to a means of communication be-

*By Dr. Richard Feinberg, President, Northern Illinois College of Optometry, and Chairman, Section on Occupational Optometry, American Academy of Optometry. Read before the Spring Occupational Vision Seminar of the American Optometric Association, The Ohio State University, Columbus, Ohio, March 23, 1953.

tween larger numbers of people, and eventually became slowly but surely a reliable and useful tool in our civilization. Today, it is an absolute necessity to industry. The more conservative individuals, naturally, were the last to take advantage of its great usefulness. The parallel is interesting. Certainly, as use has been demonstrated, vision programs have multiplied. As our technological information is further integrated, these programs will become even more advanced.

Possibly the greatest need of occupational vision education has not been for the school officials, community leaders, or industrial managers, but for optometrists and ophthalmologists, themselves. The occupational vision programs, if anything, have developed *in advance* of the knowledge obtained by the professions in vision. This strange circumstance has come about largely through these factors:

1. The initial development of the safety-goggle field by the manufacturers and supply houses, with the exclusion of optometrists from various facets of the protective program.

2. Lethargy on the part of optometrists and ophthalmologists to inform themselves properly as to the problems in occupational vision and neglect to engage in necessary research.

3. Enthusiasm on the part of safety engineers, illuminating engineers, personnel administrators, psychologists, nurses, reading specialists, and others to put to active use the promising data collected in the main by non-optometrists and non-ophthalmologists.

4. Enthusiasm on the part of top school and industrial administrators to move in the progressive direction toward well-rounded vision performance programs because of both altruistic and financial rewards.

The American Optometric Association recognized early the need for policy-making in the school and industrial fields. Over a decade ago it set up proper committees to cope with the problems in these fields. The Industrial Vision Committee of the A.O.A. gained insight into the larger horizons ahead and became the Committee on Occupational Vision. The success of this and other seminars that it has sponsored is noteworthy. It has concerned itself vitally with the functional problems in the occupational area, and periodically, as necessary, has formulated new policies. All these efforts are to be congratulated, and the Committee by virtue of its past and present performance should enjoy the confidence and respect of all professional people.

Much younger is the Section on Occupational Optometry of the American Academy of Optometry. The American Academy of Optometry has had an interesting role in optometry. It was founded in 1922 in St. Louis, Missouri, the present membership being about

700. The goals of this organization, as indicated by its founders and consistently upheld by its membership and its history, are of a technical and educational rather than an economic or promotional nature. Its annual meeting, devoted to the presentation and discussion of the results of clinical and experimental research in visual problems, is attended by a membership representing all the states of this country and various foreign countries as well. The Sections on Aniseikonia, Contact Lenses, Orthoptics, and Pathology are always well attended.

It was inevitable, therefore, that any field that impinges upon optometric practice as markedly as does the occupational vision field, be recognized and explored by the American Academy of Optometry.

The first meeting of the Section on Occupational Optometry of the American Academy of Optometry was held December 8-11, 1951, in New York City, at the annual meeting of the parent organization.

The objectives were stated as the garnering of all useful information which relates to occupational seeing and the proper distribution of this knowledge to the groups interested. Sub-committees were named to carry out this work. They deal with specific problems, such as seeing in industry, on the highways, in schools, and in other occupational environments.

These Academy members have been appointed by Dr. Meredith W. Morgan, President of the American Academy of Optometry, to conduct the Section on Occupational Vision:

Dr. Richard Feinberg, Chairman, Chicago; Dr. Richard M. Hall, Cleveland; Dr. Henry B. Peters, Oakland; Dr. Herman Sager, Lake Success, New York; Dr. Edward Steinberg, New York City; Commander R. Roswell Sullivan, U. S. Navy; and Dr. John R. Wittekind, Morrisville, Pennsylvania.

The relationship with the Committee on Occupational Vision of the American Optometric Association has been clearly defined. The Academy Section will not concern itself with policy or legislative action. It is purely an educational and research entity, devoid of these political and economic aspects. It hopes to integrate its efforts to the fullest with those of the A.O.A. Committee. At the last meeting of the Academy in Rochester, in December, 1952, the A.O.A. committee chairman, Dr. E. H. Westland, presented an excellent paper, "The A.O.A. Committee on Occupational Vision—Its Contributions to Optometry." It was an impressive presentation.

In a sense, this is a return engagement for the Academy Section, and I am privileged to present to you at least a preview of what the Academy may find is one of its most significant contributions to both

the public and the profession. As so short a time has elapsed since the formation of this new Section, we can only forecast its future.

Already, some excellent papers have been given at the two annual meetings, and these were published or are being published in the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY. They include, for example, such papers as:

"Occupational Aspects of Vision from the Industrial Psychological Viewpoint," Dr. Charles Bridgman, Chairman of the Bureau of Industrial Psychology, University of Wisconsin.

"An Industrial Vision Program," Gideon Lange, Optometrist, Concord, N. C.

"A History of Industrial Vision," Mr. R. A. Sherman, Director, Department of Occupational Vision, Bausch and Lomb Optical Company.

"Optometry in the Navy," Commander R. Roswell Sullivan, Head, Optometry Section, Department of the Navy.

"A Ten Years' Report of a Vision Program," Dr. Herman Sager, Supervisor, Eye Service Section, Medical Department, Sperry Gyroscope Company.

"Third Party Interest in Visual Care," Mr. W. T. Cameron, Bureau of Industrial Safety and Visual Efficiency, American Optical Company.

"Applications of the Vertex Focometer," Dr. Harold C. Glover, Research Optometrist, Aero Medical Laboratory, Wright Patterson Air Force Base.

"New Developments in Occupational Lighting and Seeing," Dr. Sylvester K. Guth, in charge of lighting research, Lamp Division, General Electric Company.

"Job Analyses by the Optometrist," Dr. Richard Feinberg, President, Northern Illinois College of Optometry.

"Research in Occupational Seeing," Dr. N. Franklin Stump, Director, Consulting Services, Occupational Vision Department, Bausch and Lomb Optical Company.

At the first meeting in New York, also, a tour of the huge Sperry Gyroscope Company at Lake Success was made. Here, an opportunity to see various jobs at first hand proved valuable. Other tours of this nature are planned.

It is interesting to note that almost inadvertently the Academy played a significant part in helping to establish one highly known vision program in industry. Ten years ago, when the Sperry program was initiated, the need for a number of staff optometrists became manifest. The decision to employ only Academy members proved to be of the greatest merit in our interprofessional relations with the medical and nursing personnel who are oriented to think in such professional terms. Undoubtedly, this has occurred in other plants as well.

A research program is being studied and once undertaken possibly will add more knowledge to our ever-widening horizons. Papers and monographs bringing to light new concepts on the various and innumerable facets of school and industrial vision will be a result. It is to be hoped that our undergraduate and graduate curricula in the schools and colleges of optometry will benefit from this research. As the Academy admits to membership lay persons who have demonstrated interest in vision, it is possible to utilize the abilities of these experts in our program also.

It is my hope that an active cooperation will prevail between the Committee on Occupational Vision of the American Optometric Association and the Section on Occupational Optometry of the American Academy of Optometry. The efforts of both, complementing each other will enhance the recognition of optometry in the field of occupational vision.

RICHARD FEINBERG

## SPECIAL REPORT

# PROBLEMS WITH DISPENSING OPTICIANS*

### PART I—IMPROPER PROMOTIONAL ACTIVITIES

Carel C. Koch†
Minneapolis, Minnesota

As a member of the National Interprofessional Committee on Eye Care, the writer is aware of the animosities and frictions which in general exist between optometry and dispensing opticianry, particularly in certain sections of the country. This friction has been a source of discussion at committee meetings and presents one of the several major questions before the group. The committee, listed on the following page, is naturally anxious to do what it can to remove the underlying causes of the friction and thus enable all those serving the public in the field of eye care to do so in an atmosphere of honesty, fair dealing and harmony in which the public may be best served.

The animosities mentioned are, of course, not universal. Many close friendships exist between individual optometrists and dispensing opticians in all parts of the country. In general, however, it is safe to say that optometrists believe that as a group they have been treated unfairly in recent years by many of those serving the public as dispensing opticians.

The National Interprofessional Committee on Eye Care and the parent bodies which assisted in bringing the commmittee into being in 1950 started this activity with the premise that within the foreseeable

*Read before the annual meeting of the Minnesota Optometric Association, St. Paul, Minnesota, April 14, 1953. For publication in the June, 1953, issue of the AMERICAN JOURNAL OF OPTOMETRY AND ARCHIVES OF AMERICAN ACADEMY OF OPTOMETRY.

†Optometrist. Fellow, American Academy of Optometry.

Part II of this report, "The Referral Question," will appear in the August issue.

future ophthalmologists, optometrists and opticians would continue to perform certain specific and useful services in the public's best interest.

It was recognized that on ethical, educational and economic grounds there was, and probably would continue to be, some friction between the groups. It was hoped, nevertheless, that by examining the causes of this friction, wherever they existed, that suggestions could be made which would in time, when adopted, remove the causes and bring the groups closer together. As has been said, the friction between optometry and dispensing opticianry was one of the areas studied and discussed.

From the optometric viewpoint, optometrists pointed out that certain dispensing opticians (1) were improperly dispensing ophthalmic

**The National Interprofessional Committee on Eye Care**

Ophthalmologists

Dr. Alson E. Braley, Iowa City, Iowa.
Dr. Frederick C. Cordes, San Francisco, California.
Dr. Arthur M. Culler, Columbus, Ohio.
Dr. A. Gerald DeVoe, New York, New York.

Optometrists

Dr. H. Ward Ewalt, Pittsburgh, Pennsylvania.
Dr. W. C. Ezell, Spartanburg, South Carolina.
Dr. Carel C. Koch, Minnneapolis, Minnesota.
Dr. Glenn H. Moore, Chicago, Illinois.

Opticians

Mr. Henry B. Carpenter, Syracuse, New York.
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materials of very poor quality; (2) that some were conducting their dispensing businesses in a very unethical manner, in certain instances including price "bait" advertising; (3) that certain dispensers were disseminating misleading and anti-optometric propaganda in which it was stressed that only an "eye physcian" was to be trusted to examine and refract; (4) that dispensing opticians, in some instances, served as business touters for ophthalmologists and last (5) that there are still active rumors that the illegal "kickbacks" or rebates to some ophthalmologists are being surreptitiously continued by some dispensing opticians.

Opticians on the other hand, contend that certain optometrists are (1) improperly prescribing ophthalmic materials of very poor quality for their patients; (2) that some are conducting their practices in a very unethical manner including price "bait" advertising; (3) that some have openly gone into the dispensing and laboratory business as a side line to their practices; (4) that some were working in collusion with certain opticians by doing referred refractions for these men, and that (5) in certain areas groups of optometrists have entered into a conspiracy to control the ophthalmic dispensing field through amendments to State Optometry Laws or through court actions which, if successful, would drive dispensing opticians out of business.

These are some of the principle causes of the friction existing today between optometry and dispensing opticianry. These are the problems the committee has before it. If the National Interprofessional Committee on Eye Care is to fulfill its function, some way must be found to eliminate these irresponsible practices wherever they exist.

These charges on both sides have some substance in fact. It is true that in both groups certain irresponsible individuals do use ophthalmic materials of doubtful quality which may prove harmful to the public. However, these individuals are a small minority of the total body of optometrists and dispensing opticians.

Here the writer believes that the solution to be recommended by the committee to its parent bodies is education and more education. The job must be done by our official associations. The facts must be made clear to both the public and to the recalcitrant optometrist or dispenser that his thoughtless and selfish acts may have a most serious effect on vision itself and on the nervous system of those individuals served in this manner.

The question of unethical practice and "bait" price advertising has been with us for a long time. In optometry, the past 30 years has seen a marked reduction in this type of practice. Official optometry

has been, and is now doing, everything in its power to stamp out these practices where they exist among its practitioners. Every year sees additional State legislation controling optometric methods of practice, and in addition, the Code of Practice of the American Optometric Association prohibits all optometric activities which could be called unethical. This educational optometric work will continue.

In opticianry the picture is somewhat different. Dispensing ophthalmic materials is still much more of a business than even a semi-professional pursuit. Hence, business rules, rather than ethical practice standards are in effect, and these rules are lax. In general most dispensing opticians realize that in the long run business is best preserved when clients or customers are well served. Some fail to realize this, and like unethical optometrists, these dispensing opticians are the offenders that are causing the trouble.

Unlike optometry, opticianry has but few State laws regulating its practice to fall back upon and, consequently, the establishment and enforcement of practice standards falls upon voluntary associations of dispensing opticians where these exist. Here again the work must be largely educational for the time being, as it was 60 years ago in optometry when the transition started to take place, changing it from a business activity to a professional calling.

The foregoing problems, however serious they may be, are not the only cause of the friction between optometry and opticianry. The major source of irritation is, in the writer's judgment, the dual activity of many dispensing opticians, first through their misleading advertising in which they, at times, belittle the optometrist's educational background and his refractive ability, and second, the conduct of some dispensing opticians in acting as a steerer and capper for unsuspecting patients to be delivered by collusion to certain ophthalmologists' offices for refractions. These are the activities which are engaged in by many dispensing opticians. These are the activities which have so seriously irritated local optometric groups—irritated them to a point that they have resorted to court actions and to special legislation to stop this improper traffic in patients and to stop the deceitful innuendos against optometrists and the general misleading tone of many ads inserted in the press and radio by dispensing opticians.

When dispensing opticians claim that optometrists are conspiring to eliminate them from their field they are mistaken. There is no desire on the part of optometry to take over or invade the field of opticianry. The American Academy of Optometry has for more than 30 years prohibited its member optometrists in the United States from filling

any prescriptions not written or originating with the member himself. The American Optometric Association Code of Practice which was adopted in 1950 has a more or less similar provision. Optometrists are now, and have been for years, educated to dispense only the ophthalmic materials needed by their own patients. They are not seeking outside ophthalmic dispensing business. This is the official position of organized optometry. The Board of Trustees of the American Optometric Association approved a resolution in 1951 dealing with this subject. The resolution which follows is the official position of the profession with respect to opticianry and dispensing.

> "*A statement of the official policy of the American Optometric Association relative to opticianry.* Since it has been the declared policy of optometry not to fill prescriptions originating with any other practitioner, optometry has no desire to interfere with opticianry carrying out this activity. Optometry appreciates that many ophthalmologists have their prescriptions filled by opticians and optometry has no desire in any way to modify, impair or interfere with that relationship."

Why, then, the court actions against certain dispensing opticians, and why the legislative attempts directed against dispensing opticians? These were local actions taken by optometrists who were fed-to-the-teeth with the chicanery carried on in the guise of a public service by some dispensing opticians and some ophthalmologists. These actions were local outbursts—taken in many instances against the judgment and advice of their official parent organization, and these actions will grow and continue unless steps are taken to correct the basic problems already mentioned.

What are these basic problems? After excluding the price "bait" advertising which education or legislation must correct, there remain two major questions: first, the misleading and anti-optometric propaganda used by some dispensers, and second, the activities of certain dispensing opticians in serving as steerers and cappers for favored ophthalmologists.

The first of these remaining problems will be discussed in this report. The second problem will be covered in a report to be published in the August issue of this publication.

In many urban centers certain dispensing opticians have adopted the practice of using both radio and newspaper advertising to attract business. As optometrists we are not concerned with this, for if dispensing opticianry is a business, certainly advertising may play a legitimate part in its conduct. If, on the other hand, dispensing opticians

profess their calling to be a profession, or even a semi-profession, then advertising is of very questionable taste, and should be discarded as a method of practice development.

In any event, the advertising itself is not the problem. The problem revolves, not around the question of whether or not the dispensing optician may or should advertise, but rather on the type of announcements or advertisements which are used by these dispensing opticians.

These men advise the public on all sorts of visual and pathological problems as these affect the eye. They set themselves up before the public, through their use of paid space or paid time, as authorities in the field of eye care. Their ads discuss cataract, glaucoma, myopia, presbyopia, astigmatism, the use of "drops" in refractions, visual and eye hygiene and many other similar subjects, as though they could contribute much of value on these subjects. Their ads discuss these matters in such manner as to impress the public that they are authorities on these subjects. This advertising is dishonest and misleading and should be stopped. By means of its use, the dispensing optician deliberately confuses the public into believing he has an educational background, skill and license to practice in fields, which in most instances he lacks.

The advertising referred to here plays down the fact that the advertiser is an "optician." Rarely, if ever, do the ads mention the fact that what the dispensing optician does, is to fill prescriptions written by those who do examine and refract eyes. Casually hearing or reading the advertising referred to, gives the impression that any and all sorts of eye problems may be corrected on the premises by the advertiser in a while-you-wait manner. The fact that no *refracting, or visual testing, or eye examining* is ever done by the dispensing optician is never mentioned. This factual information is most frequently concealed in what seems to be a deliberate attempt to mislead the public and to bring into the store patients who have visual or eye problems which really require the services of an ophthalmologist or an optometrist.

These same advertisers occasionally add another slant to their advertising copy—this being the advice to the public that only an eye physician should examine eyes. The inference here is clear—the public is advised not to seek the services of optometrists. This added gimick is used to impress some ophthalmologists. The dispensing optician hopes to get more prescriptions to fill from these men. It is an open bid for business from ophthalmologists—but it is also misleading and deceitful, and as we already know it is causing trouble in certain states.

Now what may be done about it? How can these problems be solved? The writer believes that the majority of dispensing opticians are proud of their work and look with little favor on the activities mentioned which cause the friction. He also knows that many dispensing opticians regret the actions of their fellow dispensers and that they never resort to the type of propaganda mentioned in the advertising they do. He also knows that many regret the friction which exists between dispensing opticianry and optometry, and that these men feel that the friction is now depriving them of some optometric referred business which they would get if the friction was removed. These men do not expect optometrists to stop doing their own dispensing for their own patients, but they do feel that in certain cases they would receive work of this kind if better relations existed.*

The writer would like to suggest to the members of the National Interprofessional Committee on Eye Care and to dispensing opticians in general the following proposal which may lead to *Standards of Practice* which, when in effect, would eliminate many if not all of the problems mentioned. At the same time it is understood that optometry would vigorously continue its work on ethical practice concepts, in correcting those abuses by optometrists which irritate dispensing opticians.

The first step in solving these problems would be for the dispensing opticians in each locality or State to meet, and determine if they cannot, among themselves, set up certain minimum standards of practice which would remove the causes for friction when adopted.

The next step would be for them to meet with optometric and ophthalmological leaders in the State or area, to enable all these groups to understand and cooperate on the suggested solutions or standards. State Interprofessional Committees on Eye Care may be of great help. Even if all dispensing opticians refuse to abide by the standards agreed upon—a significant advance will be made if a number of them follow through at the start. If most dispensing opticians agree, the radio stations and newspapers will usually bring the outsiders into line in observing the Standards agreed upon.

The third step would be a joint meeting of the groups with the local newspaper and radio advertising people, and with the representatives of the Better Business Bureau staff present at the meeting, if a Bureau exists in the State. Whatever local agreement is reached should be thoroughly explained to these groups to get their fullest cooperation.

At these meetings, neither optometry nor ophthalmology should

*This is not true in California where legislation prohibits dispensing opticians from filling prescriptions written by optometrists.

in the writers opinion, suggest to dispensing opticians that they stop radio or newspaper advertising. The only suggestions which might properly be made would be that the ads deal with the proper subject matter—i.e., lenses, frames, corrective glasses of all sorts and protection lenses, sport glasses, styles in frames and the true service the dispenser is able to render to persons needing these ophthalmic materials.

The writer proposes that the dispensing opticians in State or local areas initiate these meetings. If this is impossible—the local Better Business Bureau will do so if asked by several of the leading dispensers as the problems mentioned have been before all Bureaus for some time, and they are seeking a proper solution just as are the better elements in opticianry, optometry and ophthalmology.

The suggested meetings are likely to prove successful, and should result in a better feeling throughout all groups. It will also result in a closer and more useful type of cooperation which will, in turn, bring about a better general level of service to the public. If these local or State meetings fail, it is then time for the committee to explore other methods of bringing about the desired results.

The writer submits the foregoing as a proposal to the groups involved and to the National Interprofessional Committee on Eye Care. If adopted by the committee these proposals will be referred to the parent bodies for consideration. Optometry and dispensing opticianry should work in an atmosphere of complete harmony as both, in different ways, serve the public. When this harmony is absent and more or less open warfare takes its place, all those in the field of eye care suffer as the public's confidence is undermined by the obvious evidences of friction and mistrust. The writer believes it is the duty of the officials of our parent bodies to meet and lay the foundation for *Standards of Practice* which will bring about the proper area in which a genuine and lasting service can be supplied to the public.*

*Part II of this report will appear in the August issue.

## *ABSTRACTS*

MOVIE PROJECTOR AS AN AID TO REFRACTION. Elmer Eger. The Pennsylvania Optometrist. 13.3.5.1953.

The author recommends the use of motion pictures, projected from a 16 to 18-foot distance, upon a large screen placed before the patient, as a fixation target for an optometric static skiametric examination. Eger finds patients' fixation better than when ordinary targets are used and that the patients' retinal reflex is bright and steady and that the pupil size is fixed. With proper film selection both adults and children are intrigued with the procedure and the author claims the results more than justify the additional expenditure for equipment and space.

CAREL C. KOCH

# CURRENT COMMENTS

Terry Judith Parkins
Editorial Assistant

Optometrists will confer a favor by sending news items of general interest for this department: such as relate to new instruments, clinical techniques, education, visual health and optometric legislation and organization.

## PRINTER'S INK MODEL STATUTE

According to recent testimony[1] price advertising on the part of optometrists is now prohibited by law in 18 States. In addition, in virtually all 48 States the official State Optometric Associations code of practice or ethics prohibits this activity on the part of member optometrists. In many of the States where the practice is not as yet prohibited by law, the State Optometric Associations have attempted, during recent years, to amend their statutes relating to optometry to include this prohibition. The reason for this action is that price advertising of optometric services and materials has been found to be usually inaccurate and misleading from the public standpoint.

Our associations have found that it is impossible for the optometrist to do proper work for the great majority of optometric patients at the prices usually quoted in the ads, and at the same time keep the quality of professional service and material up to even minimum standards. Usually this price advertising is nothing more than "bait" advertising.

Our associations have also found that the advertiser, as a general rule, has no intention of doing the work or prescribing the materials at the prices mentioned. The advertiser uses the low prices quoted in the ad merely to get prospective patients into his office, and then by high pressure sales and credit inducements switches the patient to a type of service frequently more costly than that usually provided by ethical optometrists in the same area.

During recent years, optometric associations in attempting to amend optometric statutes to prohibit price advertising have run into stiff opposition on the part of State and National Editorial Associations. This newspaper opposition is regretted, and will have to be overcome either through conferences in which a mutual level of agreement is reached, or by sheer force of logic in the legislative halls.

In the meantime, optometric associations might consider using the Printer's Ink Model Statute, false advertising bill, which is now a law in many States, and which may be used to curb those few optometric

[1]Report presented to the Committee on Public Health, Minnesota House of Representatives, 1953 session.

offenders who are preying on the culpability of certain individuals. The amended Printer's Ink Statute as approved by the Minnesota Legislature in 1953 is similar to many of these acts. The law itself follows:

AN ACT to prevent untrue, deceptive or misleading advertising without proof of damage to any person, declaring any violation thereof to be a misdemeanor providing also for injunction; amending Minnesota Statutes 1949, Section 620.52.

620.52. Any person, firm, corporation, or association who, with intent to sell or in anywise dispose of merchandise, securities, service, or anything offered by such person, firm, corporation or association, directly or indirectly, to the public for sale or distribution, or with intent to increase the consumption thereof, or to induce the public in any manner to enter into any obligation relating thereto, or to acquire title thereto, or any interest therein, makes, publishes, disseminates, circulates, or places before the public, or causes directly or indirectly, to be made, published, disseminated, circulated, or placed before the public in this state, in a newspaper or other publication, or in the form of a book, notice, handbill, poster, bill, label, price tag, circular, pamphlet, program, or letter, or over any radio or television station, or in any other way an advertisement of any sort regarding merchandise, securities, service, or anything so offered to the public, for use, consumption, purchase, or sale, which advertisement contains any material assertion, representation or statement of fact which is untrue, deceptive, or misleading, shall whether or not pecuniary or other specific damages to any person occurs as a direct result thereof, be guilty of a misdemeanor, and any such act is declared to be a public nuisance and may be enjoined as such.

The duty of a strict observance and enforcement of this law and prosecution for any violation thereof is hereby expressly imposed upon the commissioner of business and research and development, and it shall be the duty of the county attorney of any county wherein a violation of this section shall have occurred, upon complaint being made to him, to prosecute any person violating any of the provisions of this section.

The salient points of this legislation are (1) that anyone may bring the action against the offender; (2) that both the state and county officials are charged with enforcement; (3) that while a first offense is only a misdemeanor, county attorneys are also charged with securing an injunction against further offenses. This law *has* teeth, and as has already been said, more or less similar laws have been enacted in many States. Attorneys working on the cases of optometric offenders might explore the possibilities of using these Printer's Ink Model Statutes where the optometric act in the state itself fails to permit proper enforcement.

## NATIONAL BOARD CANDIDATES APPROVED BY NEW JERSEY EXAMINERS

The following significant resolution was adopted by the New Jersey State Board of Optometrists, adding this State to those now accepting candidates for licensure in optometry from the National Board of Examiners in Optometry. The resolution follows:

"Be it resolved that the New Jersey State Board of Optometrists by virtue of the power vested in it by the Legislature of the State of New Jersey will accept, after January 1, 1954, any optometrist to practice in New Jersey who has successfully passed all the parts of the examinations given by the National Board of Examiners in Optometry, under the following conditions:

(1) The applicant must, in the judgment of the New Jersey

State Board of Optometrists, be acceptable in all respects as to his character, education and all legal requirements of the Optometry Law of the State of New Jersey.

(2) The applicant will be exempt from all examinations except that provided for in paragraph three.

(3) The applicant must pass a clinical examination given by the New Jersey State Board of Optometrists.

(4) The applicant must sign an affidavit that he will always conform to the Code of Practice of the New Jersey Optometric Association and the Optometry Law of this State. A violation will be cause for revocation of any license issued under this regulation.

"This Resolution passed on the 26th of May, 1953, by the New Jersey State Board of Optometrists."

SPEAKERS AT A.O.A. CONGRESS

Four Academy members were the speakers at the annual Congress of the American Optometric Association at Rochester, New York, June 21-24. Dr. J. I. Pascal, New York City, spoke on the "Pascal-Raubitschek Test for Astigmatism." Dr. Monroe J. Hirsch, Los Angeles, spoke on "A Glaucoma Work-Up for Optometrists." Dr. Henry W. Hofstetter, Bloomington, Indiana, spoke on "Optometric Contribution in Accommodation and Convergence Studies." and Dr. Richard Feinberg, Chicago, spoke on "Vision, the Vital Component of Man's Work-World."

ACADEMY MEN IN THE NEWS

Dr. Alpheus W. Smith, Columbus: Dr. M. Kauhl and Dr. Carl Radde of Cleveland were initiated into honorary membership in Epsilon Psi Epsilon at the School of Optometry, The Ohio State University, Columbus.

Dr. James Wahl, President of the American Optometric Association, was the commencement speaker at the 35th commencement of the Pennsylvania State College of Optometry, Philadelphia, June 11th.

Speakers at the Second Annual Central Atlantic Optometric Assembly were Dr. Thaddeus Murroughs, Chicago: Dr. William Feinbloom, New York City, and Dr. Carel C. Koch, Minneapolis.

At this same Optometric Assembly in Atlantic City, New Jersey, Dr. Albert Fitch, President of the Pennsylvania State College of Optometry, was presented with an Honorary Certificate in recognition of his 50 years of service to optometry and optometric education. The presentation was made in behalf of the New Jersey, Maryland, Delaware

and District of Columbia Optometric Associations by Dr. Carel C. Koch, Minneapolis.

Dr. Monroe J. Hirsch, Los Angeles, spoke before the Central California Optometric Association on May 3. His topic was "Aberrations of the Eye."

Dr. Max Schapero and Dr. Monroe J. Hirsch of Los Angeles spoke before the New Mexico Optometric Association annual convention at Silver Springs, May 25-26.

Dr. Carl F. Shephard, Chicago, and Dr. W. J. Heather, Southbridge, spoke before the annual Summer Convention of the Indiana Optometric Association, May 24th, at Bloomington. Dr. H. W. Hofstetter, Bloomington, took the optometrists present at the meeting, through the new division of Optometry at the Indiana University.

Dr. Paul L. Connolly, Detroit, has resigned as editor of the MICHIGAN OPTOMETRIST. His place will be taken by Dr. Lynn D. Allen, Jr., Pontiac.

Dr. Rudolph Ehrenberg, President of the National Board of Examiners in Optometry, has announced that more than 250 graduates will take the three-part National Board Examinations given at this time each year in various parts of the country.

GIERSBACH LEAVES PACIFIC U

The announcement has been made that Dr. Walter C. Giersbach, President of Pacific University, Forest Grove, Oregon, has resigned on April 29. The Board of Trustees has appointed Dr. Edwin T. Ingles, Dean of the University, to serve until a new President is elected.

UNIVERSITY OF CALIFORNIA

In recognition of the program which has been carried on by the Optometry Alumni Association of the University of California, the California Alumni Association has elected Dr. Frederick W. Hebbard, President of the Optometry Alumni Association, to membership in the Alumni Council, composed of 36 U. C. alumni.

Previously the alumni associations of the schools of medicine, dentistry, pharmacy and nursing had been given similar recognition. The action by the California Alumni Association is additional evidence of the recognition which optometry as a profession is receiving. Because of this recognition, the Optometry Alumni Association will be listed in each issue of the California Monthly as one of the professional alumni groups. Mr. John T. Symes, San Francisco investment banker, is

President of the California Alumni Association and Mr. Stanley E. McCaffrey is its Executive Manager.

CALIFORNIA OCCUPATIONAL VISION SERVICES

On March 25, 1953, the California State Board of Optometry issued a certificate to the California Optometrists' Occupational Vision Services, under the provisions of Section 9201 of the California Corporations Code. The Corporation was approved by the board after the By-Laws and Articles of Incorporation were amended to comply with the various sub-divisions of this section. Therefore C.O.O.V.S. is now in a position to render the visual screening service for which it was designed.

The primary purpose for which the corporation was formed is to engage in visual testing of occupational groups under contract arrangements for the purpose of classifying and screening employees whose visual capacities are not up to the maximum efficiency for the performance of their chosen, or assigned, positions. Also to make recommendations and referrals on behalf of those who may be in need of optometric care. To extend these optometric services, the corporation is made up of a membership of California licensed optometrists. It is organized with the opportunity to render professional services upon a uniform basis.

At the annual meeting of the corporation held on February 22nd in Santa Barbara, California, the president reported that there are now about 575 members who belong to C.O.O.V.S. At the first meeting of the Board of Directors, held in Los Angeles on March 12th, the following officers were elected by the board: Dr. Ken R. Douglas of Inglewood, president; Dr. Leonard Osias of San Lorenzo, vice-president; Dr. Harry Jolliffe of Glendale, secretary; Dr. Walter Studt of Hollywood, treasurer; Dr. Joseph Ziff of Los Angeles, director.

NEWS BRIEFS

Mrs. Dorothy Gray, Executive Secretary of the Illinois Society for the Prevention of Blindness, delivered the commencement address at the eleventh convocation of Chicago College of Optometry. . . . The Honorable George E. Drach, member of the Senate of the Illinois General Assembly was the commencement speaker at the 108 convocation of Northern Illinois College of Optometry, Chicago, May 31. . . . The National Congress of the Canadian Association of Optometrists will be held in Montreal, Province of Quebec, July 5-7. . . . The dates have now been set for the 1954 Optical Fair in Chicago. These are June 2-12, just a year from now. The place will be the Palmer House and all optometrists are invited to attend this outstanding exhibition of

instruments, books and materials. . . . The Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y., has just issued a new monograph, "Recommended Practice for Supplementary Lighting." The price of this 16 page, plus cover, monograph is 50c. Orders may be sent direct to the Society.

## BOOK REVIEW

CLINICAL STUDIES IN READING, II. Edited by Helen M. Robinson. Supplementary Education, Monograph No. 77. University of Chicago Press. 189 pages, paper cover, $3.75. 1953.

This is the second of a series of reports on research and education completed and in progress at the Reading Clinic of the University of Chicago. The collection of reports in this volume is concerned primarily with vision problems in relation to reading. A few of the reports deal specifically with such related factors as personality adjustment, reading rate, sex differences, auditory deficiencies, and the selection and use of trade books. The list of contributors include, besides the editor, Charles B. Huelsman, Jr., Ruth H. Solomon, Lillian P. Stevenson, June Frary Mitchell, Gertrude Knox, Mildred C. Hughes, Dorothy L. Poling, Sidney Holmes, Fred W. Jobe, Arnold Gesell, Thomas H. Eames, Marguerite Eberl, and Mary K. Eakin, most of whom report directly from research conducted in connection with the Reading Clinic, while the others contribute as guest authors. This book may well represent the most comprehensive study of the relationship between reading and vision ever conducted as a single continuous project.

Of particular interest to the optometrist are the reports on visual screening tests as used on several groups of elementary school children. Altogether 59 separate visual tests were employed. None of these were measures of refraction. Included among the statistical methods of analyzing the data was that of factor analysis, with results pointing to some very promising areas of further research. It is apparent that the currently popular methods of screening are by no means adequate. In fact the only visual scores which consistently differentiated high and low achievers at two grade levels involved convergence and divergence skills, and these tests are not included in current visual screening batteries.

Throughout the report on screening tests there is apparent the underlying philosophy that the essential justification for visual testing of school children is that of detecting children whose visual limitations

interfere with normal progress in reading. The reader might well wonder why visual tests should not be given for the sake of good vision, whether or not there is an apparent relationship with reading performance.

A very original contribution is Knox' study of the validity of classroom symptoms as bases for referral for optometric services. Thirty carefully selected symptoms were included.

Especially enlightening is the report by Huelsman on educational changes induced by the Coordinated Classroom in a Wisconsin school. The results do not confirm earlier reports from a similar Texas project. The author suggests, perhaps kindly, that the difference in latitude may be a factor.

Discussions by Eames and Eberl are both very straight-forward and reflect certain conventional clinical viewpoints not clearly in accord with evidence brought out in other parts of the monograph. Fred Jobe gives a remarkably comprehensive yet reasonably explicit summary of the structure and function of the visual mechanism. Gesell discusses child development in relation to vision and reading, devoting approximately one-fifth of his dissertation to the wonders of retinoscopy. It is difficult to reconcile many of his statements with the facts of research, but perhaps this is because his concepts are couched in verbiage that defy this reviewer's comprehension. Typical of his assertions is the statement, "Television is the technological ultimate of the projective propensity which began with the paintings of the Aurignacian cave men."

Altogether the monograph is well organized and most capably edited. Dr. Robinson's own contributions, commentaries, and summaries serve to make this a very useful and comprehensive reference book for every optometrist. It will lend itself well as a text-book in optometry courses dealing with vision of school children and the relationships of reading and vision.

H. W. HOFSTETTER

DIVISION OF OPTOMETRY,
INDIANA UNIVERSITY.

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## TRANSACTIONS OF THE AMERICAN ACADEMY OF OPTOMETRY

A department devoted to announcements, reports, appointments, organization data, news, professional problems and ideals, as these relate to the Academy.

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SAN FRANCISCO-BAY AREA CHAPTER

The April meeting of the San Francisco Bay Area Chapter was held

in Minor Hall of the School of Optometry Building, University of California. Enthusiastic compliments about the facilities and appearance of the building now that the remodeling program is completed were expressed by all present. The speaker of the evening was Dr. Darrell B. Carter, who presented a paper, "A further demonstration of phi movement cerebral dominance."

Recently elected officers of the chapter are Dr. Robert F. Harrigan, Berkeley, chairman; Dr. Henry B. Peters, Oakland, vice-chairman; Dr. Darrell B. Carter, Berkeley, secretary-treasurer; Dr. Arthur Emmes, Castro Valley, admissions chairman; and Dr. Arthur Jampolsky, San Francisco, member-at-large of the executive committee.

NORTHEASTERN OHIO CHAPTER

Dr. Joseph A. Wey, Painesville, was elected chairman at the May meeting of the Northeastern Ohio Chapter at Cleveland. Other officers elected were Dr. Joseph E. Fitzgerald, Cleveland, vice-chairman; Dr. Paul A. Wilkinson, Wellington, secretary. The officers and Dr. George F. Jones, Salem; Dr. Lloyd D. Dolbear, Lorain, and Dr. Nelson E. Abrahamsen, Cleveland, constitute the executive council.

NORTH CAROLINA CHAPTER

Dr. John C. Neill, Pennsylvania State College of Optometry was the speaker at the 1953 Spring meeting of the Chapter, June 14, at Winston-Salem. His topic was "Sub-Normal Visual Aids."

NEW YORK ACADEMY OF OPTOMETRY

Dr. Herman Sager, Sperry Gyroscope Company, Lake Success, and Mr. Lloyd Powell of the Bausch & Lomb Optical Company discussed and demonstrated the new professional model Ortho-Rater at the March meeting of the Academy.

Dr. Edward L. Seretan, ophthalmologist, New York City, was the speaker at the April meeting. His topic was "The Relative Importance of Orthoptics and Surgery in Strabismus."

MICHIGAN CHAPTER

Dr. Robert E. Van Sluyters, Grand Rapids, was elected chairman at the April meeting of the Michigan Chapter. Other officers elected were Dr. Robert A. Hass, Owosso, vice-chairman; Dr. George Harkless, Pontiac, secretary. The following optometrists were elected to membership in the Chapter at the same meeting: Dr. Donald G. Cummings, Midland; Dr. Kenneth Kiess, Hillsdale; Dr. George T. Mayer, Adrian; Dr. Joseph D. Sasaki, Ann Arbor, and Dr. Fred C. Franks, Lansing.

## ANNOUNCEMENTS

### UNIVERSITY OF CHICAGO—16TH ANNUAL CONFERENCE ON READING

The Annual Reading Conference at the University of Chicago will be held in Mandel Hall, June 29 through July 2. The central theme of the conference is "Corrective Reading in Classroom and Clinic." This problem has been selected in response to a large number of requests from teachers, school officers, and librarians for assistance in understanding how to improve reading instruction for pupils who do not read satisfactorily.

The first morning will be a general session, featuring a report of the UNESCO study of methods of teaching reading in many countries of the world. The second presentation will point up the problems in corrective reading in this country and emphasize the importance of the theme. Each of the half-day sessions thereafter will be directed toward specific aspects of corrective reading. The general sessions are planned for all Conference members, and the speakers at these sessions will direct attention to basic issues and principles.

Sectional meetings following the general sessions are planned for those interested at specific classroom levels and for reading clinicians or special reading teachers. The speakers at the sectional meetings will discuss practical procedures and techniques involved in meeting the needs of poor readers at each level.

The program on Tuesday evening has been organized in co-operation with the National Association for Remedial Teaching. At this session representatives from several reading clinics will present unusually interesting case studies to illustrate techniques used in diagnosis and remedial instruction of severely retarded readers.

Various activities are planned to follow the afternoon sessions. They include: a reception for members of the Conference; guided tours of the campus; exhibits of outstanding books for youth published since the 1952 Conference; the annual exhibit of textbooks by publishers; and a visit to the University Reading Clinic.

The University extends a cordial invitation to teachers, school officers, optometrists and all others interested in reading to attend the Conference.

The registration fee is $7.00. Registration should be made in advance to Mr. Albert F. Cotton, Bursar, The University of Chicago, Chicago, Illinois.

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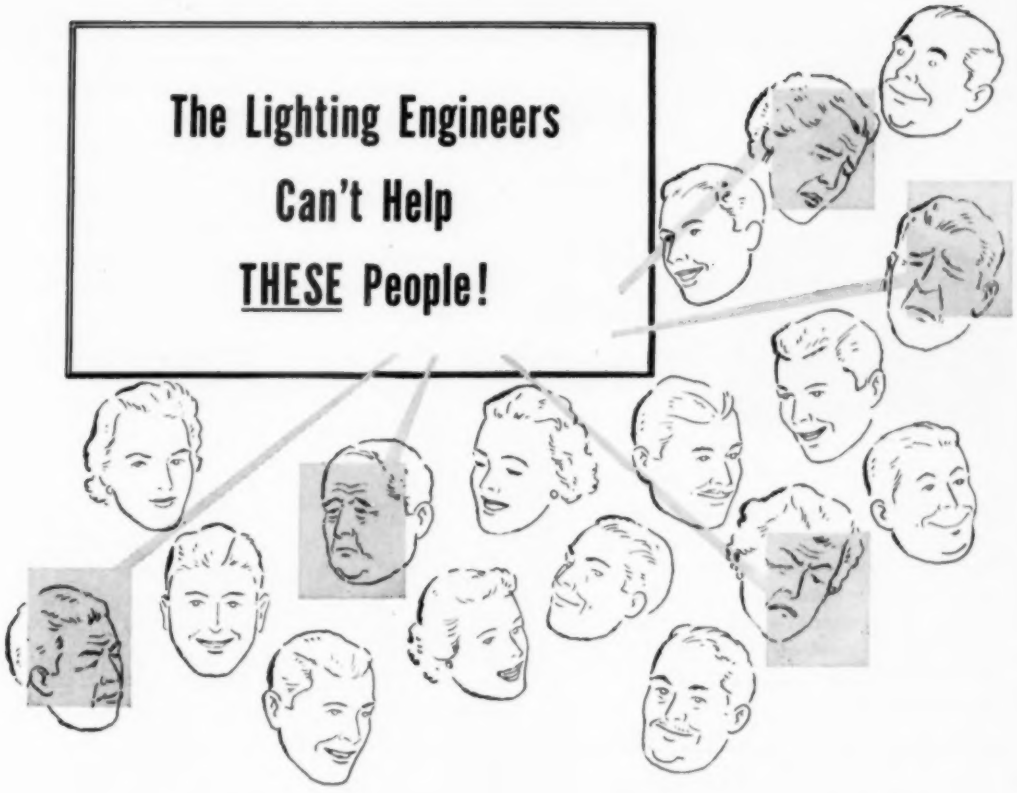

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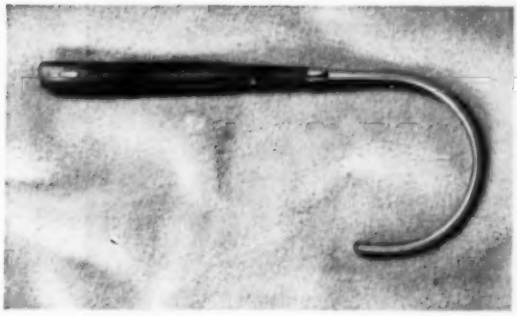

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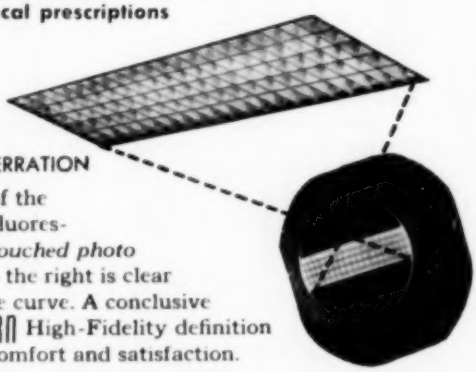

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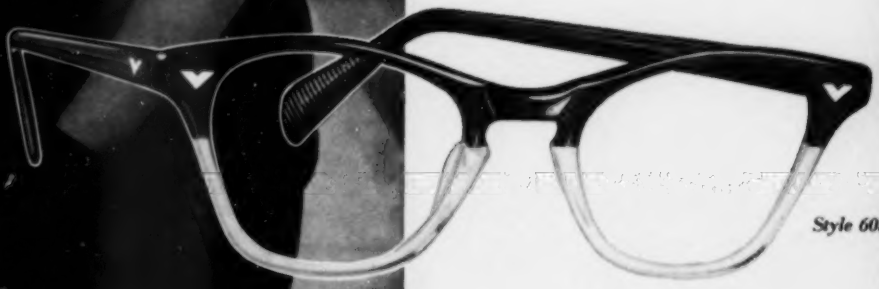

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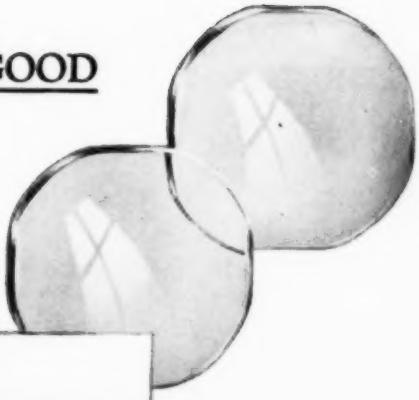

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